"The Prehistoric World: or Vanished Races"

By E. A. Allen

THE PREHISTORIC WORLD:

or

VANISHED RACES.

By E. A. ALLEN,

Author of "The Golden Gems of Life."

Each of the following well-known Scholars reviewed one or more

Chapters, and made valuable suggestions:

C. C. ABBOTT, M.D.,

Author of "Primitive Industry."

Prof. F. W. PUTNAM,

Curator of Peabody Museum of Archaeology and Ethnology,

Harvard University.

A. F. BANDELIER,

Explorer for Archaeological Institute of America,

author of "Archaeological Tour in Mexico."

Prof. CHARLES RAU,

Curator of Archaeological Department of Smithsonian Institution.

ALEXANDER WINCHELL, LL.D.,

Professor of Geology and Paleontology,

University of Michigan.

CYRUS THOMAS, PH.D.,

Of the Bureau of Ethnology.

G. F. WRIGHT,

Of the United States Geological Survey,

Professor in Theological Seminary, Oberlin, Ohio.

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END OF TITLE**********

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PREFACE

In this volume the author has sought to lay before the reader a description of life and times lying beyond the light of history. This is indeed an extensive subject, and calls for some explanation, both as to the general design of the work and what steps have been taken to secure correct information.

History is a word of varied import. In general, when we talk about history, we mean those accounts of past events, times, and circumstances of which we have written records. Not necessarily meaning alphabetical writing, because hieroglyphic records have furnished much true history. Hieroglyphic writing, which long preceded alphabetical writing, is itself a comparatively recent art. In no country do we find any records carrying us further back than a few thousand years before the Christian era. We have every reason to believe that the historical part of man's life on the globe is but an insignificant part of the whole. This historic period is not the same in all countries. It varies from a few centuries in our own country to a few thousands of

years in Oriental lands. In no country is there a hard and fast line separating the historic period from the prehistoric. In the dim perspective of years the light gradually fades away, the mist grows thicker and thicker before us, and we at last find ourselves face to face with the unknown past.

This extensive period of time is not, however, utterly lost to us. We have simply to gather our information in some other way. Enthusiastic explorers, digging beneath the ashes of Vesuvius, have brought to light the remains of an entombed city. Of this city we indeed have historic records, but even if all such records had long since disappeared, we would gather much information as to the nationality of the inhabitants, their customs, and manners, by a simple inspection of the relics themselves. Everywhere over the earth, entombed beneath the feet of the living, or crumbling on the surface, are the few relics of a past far antedating the relics of Pompeii. They are the proofs positive that some people inhabited the land in far away times.

Our object is to gather together the conclusions of the scientific world as to primitive man. We wish to see how far back in the geological history of the globe we can find evidence

of man's existence, and we desire to learn his surroundings and the manner of his life. There can be no more important field than for us to thus learn of the past. To read the story of primitive man, to walk with him the earth in ages long ago, with him to wage war on the huge animals of a previous epoch, to recede with him before the relentless march of the ice of the Glacial Age, to watch his advance in culture, to investigate whether there are any races of men now living which are the direct descendants of this primeval man.

The author makes no claims to original investigations. He trusts, however, it will not be considered impertinent for a mere loiterer in the vestibule of the temple of science to attempt to lay before others the results of the investigations of our eminent scholars. He has endeavored faithfully to perform this task. As far as possible technical language has been avoided. This is because he has written not for the distinctively scientific men, but rather for the farmer, the mechanic, and the man of business. Constant references are made to the authorities consulted. The reader his a right to know who vouches for the statements made in the text.

The pleasantest part of an author's duty is to return thanks for

assistance. After the manuscript was prepared with what care could be bestowed on it, it was determined to submit it to some of our best American scholars for criticism. Accordingly, each of the gentlemen named on the title page were requested to review one or more chapters. As far as possible, each one was asked to review that chapter or chapters for which, either by reason of the position they held, or the interest they were known to take in such subjects, they would by common assent be acknowledged as eminently fitted to sit in judgment. In justice to them, it should he stated that they were not expected to concern themselves with the literary merits or demerits of the manuscript, but to criticise the scientific statements made therein. To each and all of these gentlemen the author would acknowledge his deep obligations.

We are indebted to Rev. J. P. MacLean, the well-known archaeologist, both for many valuable suggestions, and for the use of wood-cuts on pages 60, 138 and 396. We are also under obligation to Rev. S. D. Peet, editor of the *American Antiquarian,* for cuts illustrative of the effigy mounds of Wisconsin. The officials of the Smithsonian Institution, and the Bureau of Ethnology have our thanks for many cuts, for which credit is given them throughout the work.

Finally, the author wishes to say that it was the intention to make this work the joint production of the author and his partner, Mr. S. C. Ferguson, but before any progress was made it was deemed advisable to change the programme. While the literary work has all been performed by the author, the many details necessarily connected with the publication of a book were attended to by Mr. Ferguson.

E. A. ALLEN.

Cincinnati, *January* 1, 1885.

END OF PREFACE**********

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The Prehistoric World: or, Vanished Races

by E. A. Allen

THE PREHISTORIC WORLD--Chapter I

Thou unrelenting Past!
Strong are the barriers round thy dark domain--
And fetters, sure and fast,
Hold all that enter thy unbreathing reign.

Far in thy realm, withdrawn,
Old empires sit in sullenness and gloom;

And glorious ages, gone,

Lie deep within the shadow of thy womb.

Full many a mighty name

Lurks in thy depths, unuttered, unrevered:

With thee are silent fame,

Forgotten arts, and wisdom disappeared.

W. C. BRYANT

Chapter I

INTRODUCTION.

Difficulties of the subject--Lesson to be learned--The pursuit of knowledge--Recent Advances--Prehistoric past of the Old World--Of the New--Of Mexico and the South--The Isles of the Pacific--Similar nature of the relics--The wonders of the present age--History of popular Opinion on this subject--The teachings of the Bible--Nature of the evidence of man's antiquity--Geology--Astronomy--Unfolding of life--Nature of our inquiry.

Who can read the book of the past? Who can tell us the story of Creation's morn? It is, not written in history, neither does it live in tradition. There is mystery here; but it is hid by the darkness of bygone ages. There is a true history here, but we have not learned well the alphabet used. Here are doubtless wondrous scenes; but our stand-point is removed by time so vast, the mist of years is so thick before us, that only the ruder outlines can be determined. The delicate tracery, the body of the picture, are hidden from our eye. The question as to the antiquity and primitive history of man, is full of interest in proportion as the solution is beset with difficulties. We question the past; but only here and there a response is heard. Surely bold is he who would attempt, from the few data at hand, to reconstruct the history of times and people so far removed. We quickly become convinced that many centuries, and tens of centuries, have rolled away since man's first appearance on the earth. We become impressed with the fact, "that multitudes of people have moved over the surface of the Earth, and sunk into the night of oblivion, without leaving a trace of their existence: without a memorial through which we might have at least learned their names."

To think of ourselves, is to imagine for our own nation an immortality. We are so great, so strong, surely nothing can move us. Let us learn humility from the past: and when, here and there, we come upon some reminder of a vanished people, trace the proofs of a teeming population in ancient times, and recover somewhat of a history, as true and touching as any that poets sing, let us recognize the fact, that nations as well as individuals pass away and are forgotten.

The past guards its secret well. To learn of it we must seek new methods of inquiry. Discouraged by the difficulties in the way, many have supposed it hidden from the present by a veil which only thickens as time passes. In the remains of prehistoric times they have failed to recognize the pages of history. They saw only monuments of ancient skill and perseverance: interesting sketches, not historical portraits. Some writers have held that we must give up the story of the past, "whether fact or chronology, doctrine or mythology--whether in Europe, Asia, Africa, or America--at Thebes, or Palenque--on Lycian shore, or Salisbury plain--lost is lost and gone is gone for evermore." Such is the lament of a gifted writer, amongst the first to ponder over the mysteries of the past. At the present day, with better means at hand, a more hopeful view is taken.

But here a caution is necessary; for, in attempting to reconstruct the history of primitive times, such is the interest which it inspires, that many allow imagination to usurp the place of research, and write in terms too glowing for history.

The human mind is sleepless in the pursuit of knowledge. It is ever seeking new fields of conquest. It must advance: with it, standing still is the precursor of defeat. If necessary it invents new methods of attack, and rests not until it gains its objective point, or demonstrates the hopelessness of its quest. The world needs but be informed that on a given point knowledge is dim and uncertain, when there are found earnest minds applying to the solution of the mystery all the energies of their natures. All the resources of science are brought to bear; every department of knowledge is made to contribute of its store: and soon a mass of facts is established and a new science is added to the department of human knowledge.

Thus, with our knowledge of prehistoric times, what so seemingly vain as to attempt to roll back the flight of time, and learn the condition of primeval man? All the light of ancient history makes but little impression on the night of time. By its aid we

can but dimly see the outlines of the fortieth century back; beyond is gloom soon lost in night. But a few short years ago, men did not think it possible to gain further information. With the materials at hand this could not be done. The triumph of the intellect was simply delayed, not hopelessly repulsed. Geology was but just beginning to make good its claim to a place among the sciences. This unfolded to man the physical history of the world as read from the rocks, and deals with times so vast and profound that we speak no longer of years, but of ages. And with the aid of Geology grand secrets were wrung from the past, and new light was thrown on the manners and customs of primitive man. Thus the foundation for still another science was laid, called Archaeology, or the science of Human Antiquities. These two sister sciences are the keys by whose aid we have not only acquired much information of a past that seemed a hopeless enigma--but, as Columbus on the waste of waters could perceive traces of land as yet invisible, so can the present seekers after knowledge trace the signs of a satisfactory solution of many of the great questions relating to the origin and history of the vanished races of mankind.

In whatever land we commence our investigations, we quickly come upon the evidences of an ancient life long antedating all

historical information. Ancient Egypt has been a fruitful theme for the antiquarians pen. The traveler has moralized over the ruins of her past greatness, and many pointed illustrations of national growth and decay have been drawn from her history.

Here was the seat of an ancient civilization, which was in the zenith of its power many centuries before Christ. The changes that have passed over the earth since that time are far more wonderful than any ascribed to the wand of the magician. Nations have come and gone, and the land of the Pharaohs has become an inheritance for strangers; new sciences have enriched human life, and the fair structure of modern civilization has arisen on the ruins of the past. Many centuries, with their burden of human hopes and fears, have sped away into the past, since "Hundred-gated Thebes" sheltered her teeming population, where now are but a mournful group of ruins. Yet to-day, far below the remorseless sands of her desert, we find the rude flint-flakes that require us to carry back the time of man's first appearance in Egypt to a past so remote that her stately ruins become a thing of yesterday in comparison to them.

In the New World, mysterious mounds and gigantic earth-works arrest our attention. Here we find deserted mines, and there we

can trace the sites of ancient camps and fortifications.

The Indians of the prairies seem to be intruders on a fairer civilization. We find here evidences of a teeming population.

In the presence of their imposing ruins, we can not think that nomadic savages built them. They give evidences rather of a people having fixed habitations and seem to imply the possession of a higher civilization than that of the Indians.

These questions demand solution; but how shall we solve the problem? Save here and there a deserted camp, or a burial mound, containing perhaps articles of use or adornment, all traces have vanished. Their earth-works and mounds are being rapidly leveled by the plow of modern times, and the scholar of the future can only learn from books of their mysterious builders. In Mexico, and farther south, we find the ruins of great cities. To the student of antiquity, these far surpass in interest the ruined cities of the Nile or Euphrates valley. Babylon of old, with its walls, towers, and pleasure resorts, was indeed wonderful.

In our own land cities, if not as ancient, yet fallen in more picturesque ruin, reward the labors of the explorer.

Uxmal, Copan, and Palenque, invite our attention. Here are hieroglyphics in abundance, but no Rosetta Stone supplies the key by whose aid a Champollion can unravel the mystery.

The luxuriant vegetative growth of the tropics, with its fierce storms, is every year hastening the obliteration of these ruins, and we must improve the time well, if we would learn from them what they have to say of the past.

The isles of the Pacific give evidence that, long before the dawn of authentic history, man lived there. Indeed, as the islands which gem that ocean, from their configuration and position, seem to be but the elevated plateaus and mountain peaks of a continent that has gone down beneath the blue wave of the Pacific, so, throughout Polynesia can be traced the fragmentary remains of a civilization, the greater portion of which has been completely buried by the waters of oblivion, leaving only here and there a trace to reconstruct, if we can, the entire structure.

The earliest remains of man are very similar in all lands. They consist of weapons of war and of the chase, implements of domestic use, and articles of personal adornment. Few and simple as they are, they are capable of imparting useful information as to early times. By their aid we become eye-witnesses of the daily life of primitive man. We learn that though lacking in almost every thing we consider essential for comfort and

happiness, yet they were actuated by much the same hopes and fears as the men of the present age. The great burden of life was the same then as now. There was the same round of daily labor made necessary by the same ceaseless struggle for existence. Rude forts and warlike implements show there was the same encroachment of the strong on the weak as now.

This is a wonderful age in many respects. In none, however, more wonderful than in the wide-spread diffusion of knowledge. The ordinary people now understand more of nature's secrets than the wise men of old. They are to-day interested in researches that a former generation would have relegated to the scholar and the man of leisure. No department of knowledge is retained for the researches of a favored few. The farmer, the mechanic, and the man of business are alike interested in a knowledge of prehistoric times. The rude implements of the past appeal to the curiosity of all. We arise from a study of the past with clearer ideas of man's destiny. Impressed with the great advancement in man's condition from the rude savagery of the drift, to the enlightened civilization of to-day, what may we not hope the advancement will be during the countless ages we believe a beneficent Providence has in store for his creature, man?

A history of the popular opinion of the antiquity of man is not only of interest, but should teach a lesson to all who think others are wrong because not holding the same views as they do. Hardly fifty years have passed since scientific men began to attribute to the human race an antiquity more remote than that assigned them by history and tradition. At first these views met with general opposition, much as did the theory of the present system of astronomy when it was first proclaimed. We laugh now at the ignorant fear's and prejudices used to combat both.

It was claimed that the Bible taught that man had lived on the globe scarcely six thousand years. The Bible is the book to which the Anglo-Saxon mind clings with the greatest reverence. The memories of childhood are associated with its pages, and its very appearance recalls the prayers of long ago. It is not strange then that the Christian world guards with jealous care against any thing which may be thought to weaken the force of its statements.

But it is human nature to go to extremes: and, when we give our support to one way of thinking, we find it difficult to be patient with those of the contrary opinion.

Now, the researches of some of the most eminent men and learned divines have amply shown, that there are no data given in the Scriptures on which to base an estimate as to the antiquity of man. Happily the Christian mind no longer shrinks from the conclusions reached by the scientist: and, indeed, it is the contemplation of the stupendous periods of Geological times, and the infinite greatness of the works of Creation as disclosed by Astronomy, with the extreme lowness of man's first condition as made evident by Archaeology, that lend new force to the words, "What is man, that thou art mindful of him!"

The evidences on which we predicate an extreme antiquity for man are necessarily cumulative. It is not from one source alone that we obtain information, but from many. Eminent men in nearly every department of knowledge have lent their aid to the elucidation of this subject. It can only be understood by those who will fairly weigh the facts that modern discoveries have unrolled before their eyes. There are many who have not done this, and are consequently unable to project their mental vision so far back into the very night of time, as is now demanded for the beginning of man's first appearance on the earth.

And, indeed, so enormously has this period been extended--so far back does it require us to go--that even the most enlightened

investigator may well recoil in dismay when he first perceives the almost infinite lapse of years that are required by his calculation since the creation of man.

At this day the scholar must be ready to explain the steps by which he reaches his conclusions. Not necessarily explaining the minutiae of his journey hither, but the main outlines of his course. This seems to call for a slight outline of Geology. The animal and vegetable tribes which have come and gone upon the earth, following each other like the shadows of passing clouds on a Summer's day, have left their remains in the rocks which at that time were forming. A close investigation of these remains shows that they form the record book of nature, wherein we are permitted to read somewhat of her secrets. This had long been a sealed book to man; but science, as we have seen, constantly extending her domain, at length taught him the alphabet.

And the Geologist now unfolds the past age of our world with a variety of detail, and a certainty of conclusion well calculated to inspire us with grateful admiration.

It is no longer a question that many ages must have rolled away,

during which our world was totally unfit for life of any kind, either animal or vegetable.

The nebular theory of Laplace, as modified by the modern astronomers, so satisfactorily explains many of the phenomena of the solar system, that it takes rank almost as a demonstrated fact. According to the terms of this theory, our Earth, now so dependent on the sun for light and warmth, was itself a glowing orb, and as a bright star radiated its light and heat into space. Grand conception, and probably true. It is now useless to speculate as to how many cycles of almost infinite years had begun and ended, before Earth's fading fires gave notice that they must soon expire in night.

The stages through which the Earth passed in turn await the sun, save that there is no further beneficent luminary to give him light and heat: when time shall have quenched his fiery glow, death and night shall reign supreme, where now is life and light.

Time is long, and nature never hurries. She builds for infinite years, and recks not the time of building. The human mind is far too feeble to comprehend the duration of time that sped away and

was gone ere the slowly falling temperature of the Earth admitted the formation of a crust over her surface. When that came, the first great scene was closed. The star had expired, the planet rolled in her annual course around the still glowing central sun. Now came the formative age of the world, when the great continents were outlined.

The atmosphere gradually freed itself from its weight of water-vapor, the rains descended, and the ocean took form and contour. We are concerned only with the outlines of Geology, not with its details. It is full of the most interesting facts, but is foreign to our present purpose. We will only say, there is a marked progression in the scale and importance of life forms.

The lower forms of animals appear first to be followed in time by the higher. It is true that some forms have survived through all the changes of Geological time to the present: yet, speaking generally, some forms of life are peculiar to each age, and the general phase of animal life is different with each period. They thus form epochs in the history of the world as read from the rocks, and though the beginning and ending of each age may blend by insensible gradations with that of the preceding and following, yet, taken as a whole, we observe in each such

singularities of form and structure as to give name to each particular age.

In the fullness of time man appears; and it is our pleasant task to trace the evidence of his primitive state, his growth in culture, and his advancement made before the dawn of history. Our inquiry, then, is as to his prehistoric state. We use this term in the same sense as Dr. Wilson uses it: that is, to express the whole period disclosed to us by means of archaeological evidence, as distinguished from what is known through historical records. We can not doubt but that this includes by far the largest portion of man's existence. The time embraced within historical records, though different in different portions of the world, is but a brief period in comparison to the duration of time since he first went forth to possess the Earth. If we can make plain to our readers that man has lived in the world an extremely long time, going back indeed to a former Geological age--that his first state was very low and rude--that he has risen to his present high estate by means of his own exertions continued through long ages--and from this form a prophecy of a golden age to come in the yet distant future, we shall feel that we have not written in vain.

Illustration of The Sphinx.----------

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END OF CHAPTER I**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Chapter II

EARLY GEOLOGICAL PERIODS.

Necessity of a general acquaintance with the outlines of Geology--A time in which there was no life possible on the globe--Length of this period--On the formation of rocks--The record imperfect--The three great periods in animal life on the globe--Paleozoic age--Animal and vegetable life of this period--The Mesozoic age--Animal and vegetable life of this period--Advance noted--Abundance of reptilian life--First appearance of birds--Nature's methods of work--The Cenozoic age--Geological outline--Sketch of the Eocene age--Of the Miocene age--What is sufficient proof of the presence of man--Discussion of the Thenay flints--The Pliocene age--Animal and vegetable life of this age--Was man living during this age?--Discussion of this subject--Summing up the evidence--Conclusion.

For a clear understanding of questions relating to early man, a more or less extensive acquaintance with Geology is required. This is by no means a difficult task to accomplish. What so

interesting as to understand at least the outlines of the history of life on the globe? To see how, following a definite plan, the vast continents have grown to their present size and form; to see how animal and vegetable life have evolved successively higher and higher forms; to see where in this wondrous drama of creation, this strange unfolding of life, the first faint, indecisive traces of man's presence are to be found; to learn what great changes in climate, in Geogony, and in life, had occurred before man's appearance, let us pass in brief review the history of early geological periods.

As we have already stated, there must have been a very long period of time during which no life was possible on the globe. Of this era we know but little; for we find no strata of rocks of an earlier date than we know life, in its simplest forms, to have existed. Still we are not less confident of the existence of this era, and the mind can dimly comprehend the scene, when a nearly shoreless ocean surged around the globe.

As to the extent of time during which there was no life, we have no means of determining. That it was almost infinitely long is made apparent by the researches of eminent scholars on the cooling of lava. Toward the close of this extended period of

time faint traces of life appear. Not life as we are apt to think of it. No nodding flowers were kissed by the sunshine of this early time. The earliest forms of flowerless plants, such as sea-weeds, and in dry places possibly lichens covering the rocks, were the highest forms of vegetable life. Animal life, if present, for the fact is denied by some, occurs in the very lowest form, merely structureless bodies, with no especial organs of sense, or nutrition: and their motion consisting simply in protruding and withdrawing hair-like processes. Such was the beginning of life. This vast period of time, which includes the beginning, is known among geologists as Archean time.

From the close of this age, the history of life properly commences. It might be well to explain the means which the geologist uses to interpret the history of the globe. It is now understood that the forces of nature have always produced the same results as they do now. From the very earliest time to the present, rocks have been forming. There, where conditions were favorable, great beds of limestone, formed from shells and corals, ground up by the action of the sea--in other places, massive beds of sandstone or of sand, afterward consolidated into sandstone--were depositing. On the land surface, in places,

great beds of vegetable *debris* were being converted into coal. Now we can easily see how the remains of organic bodies, growing at the time of the formation of these beds, should be preserved in a fossil form. Limestone rocks are thickly studded in places with all sorts of marine formations. Coal fields reveal wonders of early vegetative growth. From sandstone rocks, and shaly beds, we learn strange stories of animal life at the time they were forming. From a careful study of these remains together with the formation in which they occur, not only in one locality but all over the earth, geologists have gradually unfolded the history of life on the globe. It is admitted that, at best, our knowledge in that direction is fragmentary. This arises from errors in observation as well as that fossil formations are rare, or at least localities where they are known to exist are but few. So our knowledge of the past is as if we were examining some record from which pages, chapters, and even volumes, have been extracted.

Illustration of Paleozoic Forest----------

In consequence of this imperfect record we can not, as yet, trace a gradual successive growth from the low forms of animal

and plant, life, that characterized the closing period of Archean time, to the highly organized types of the present. The record suddenly ceases and when we again pick up the thread we are surrounded by more advanced types, higher forms of life. Though we may hope that future discoveries will do much toward completing the records, we can not hope that they will ever really be perfected. So, from our present stand-point, the history of life on the globe falls naturally into three great divisions. This is no more than we might expect, when we reflect that nature's laws are universal in their action, and that the world, as a whole, has been subjected to the same set of changes.

The period following on after Archean time is called, by geologists, Paleozoic time.

During the long course of time embraced in this age, the forms of life present wide differences from those of existing time.

This period produced the great beds of coal we use to-day. But the vegetation of the coal period would present strange features to our eyes. The vegetation commenced with the lowest

orders of flowerless plants, such as sea-weeds; but, before it was brought to a close, there was a wonderful variety and richness of plants of the flowerless or Cryptogamic division. In some of the warmest portions of the globe, we have to-day tree-ferns growing four or five feet high. During the closing part of the Paleozoic time, there were growing all over the temperate zone great tree-ferns thirty feet or so in height. Some varieties of rushes in our marshes, a foot or two in height, had representatives in the marshes of the coal period standing thirty feet high, and having woody trunks. Near the close of the Paleozoic time, vegetation assumed a higher form of life. Flowering plants are represented. Pines were growing in the coal measures.

In animal life a similar advance is noted. The class of animals having no backbone, or invertebrate animals, were largely represented. But, toward the close of the Paleozoic time, we meet with representatives of the backbone family. The waters swarmed with fishes. Besides these, there were amphibians; and reptiles in the closing portions.

Illustration of The Pterodactyl.----------

Thus we see what a great advance was made in life during this period. The forms of life during the early stages of this age were inferior in this, also, that they were all water species. But, before it closes, we have a rich and varied terrestrial vegetation, and also air-breathing animals. The class Mammalia, to which man belongs, had no representative on the earth during the extended Paleozoic time.

We can easily see, from the foregoing, how appropriately this period has been named that of old life forms. In imagination we can recall a scene of this old age. The air is sultry and full of vapors. The soil seems hot and steaming. This is a veritable forest, but we see none of the beautiful flowers which we associate with tropical vegetation to-day. In the branches of the graceful tree-ferns, we will look in vain for birds. They were yet far in the future. Neither were there any of the higher orders of animals present. Not a single representative of the great class of mammals enlivened the depths of the forest. There were fishes in the waters, but not the fishes of to-day. Some true reptiles and amphibians disported themselves in swampy jungles, but they were unimportant. Almost the only sound to break the stillness, was the hum of marsh-loving insects, the

whistling of the wind, and the roar of the tempests, which we may well believe raged with the more than tropic severity of the present.

The time at last came for the dawning of a new era. Vast changes had been taking place in the geography of both continents. The region to the south-west of the Green Mountains was upturned. The Alleghany Mountains were formed, and the region east of the Mississippi River became part of the stable land of the continent. In Europe, nearly as great changes occurred. The conditions of life must have been greatly modified by these geographical changes. The life-forms bear testimony to this changed condition. Old forms die away, and are succeeded by those approaching more nearly our own times. The name of this period is the Mesozoic time, or the period of middle life forms. It is instructive to notice the steady advance in the type of life, both animal and vegetable. The abundant flowerless vegetation of the coal formation of the preceding epoch dwindles away. But the flowering trees increase in number and importance until, in the closing period of Mesozoic time, we have trees with deciduous leaves. A great many of our forest trees had representatives in the forests of that epoch.

Illustration of Ichthyosauri.----------

Palms and species like the big tree of California were growing side by side with species akin to our own common trees. But in the animal world there were many strange forms. This was the age of reptiles. They domineered on the land, in the air, and in the sea. On the land there stalked huge reptiles fifty and sixty feet long, and, when standing erect, at least thirty feet high. Some of these huge creatures were carnivorous, living on other animals. Others fed on the foliage of trees. In the air, huge reptilian bats, veritable flying dragons with a spread of wings from ten to twenty feet, disported themselves. In the sea there swam great reptilian whales, seals, and walruses. There was a marvelous abundance of reptilian life. At the present day, there are not more than six species of reptiles in the whole world having a length of over fifteen feet, and not more than eighteen species exceeding ten feet in length. But from one limited locality, representing but one era of this age in England, there have been discovered four or five species of carnivorous reptiles twenty to fifty feet long, ten or twelve species of crocodiles, lizards, and swimming reptiles from ten to sixty feet long--besides multitudes of great flying

reptiles and turtles. Doubtless similar scenes of animal life were everywhere represented.

Illustration of The Labyrinthodon.--------

Birds made their first appearance during the Mesozoic time, and here we obtain a clear view of nature's methods of work. There is no longer a doubt but that the first birds were simply modified reptiles. The first bird had a long jointed tail, and a bill well supplied with formidable teeth. It was during this period that the first representative of the class Mammalia, to which man belongs, appears. It is in the rocks of this era that we meet with remains of marsupials, the order to which opossums belong. This is the lowest of the Mammalian class. To the class Mammalia belong the most highly organized animals. They have been the ruling animals since the close of Mesozoic time. We must now watch their development with especial care. For this brief review, as far as it has gone, has shown a steady and gradual progress in life forms, the lower invariably preceding the higher. We therefore feel that it will be vain to seek for any trace of man until we find undoubted proofs of the existence of all the forms of animals below him. The last great

division of time is called Cenozoic. This means new life forms. In this age, the forms of life are much nearer our own. As it was some time during this epoch when man makes his appearance, we deem it best to go into more detail, and give the subdivisions of this period. It has been amply sufficient to give simply the outlines of the other periods. In order to fix more clearly the sequence of life, we will give an outline showing the periods we have reviewed, and also the subdivisions of the Cenozoic time, which we are now to examine with more care.

OUTLINE.

LIFE.

Archaean Time.

The Beginning: Includes the long lapse of time when the globe could not support life, but towards its close faint traces of life, both animal and vegetable appeared.

Paleozoic Time.

The Period of Old Life Forms: Forests of flowerless trees; but pines grew in the coal measures. Animal life largely

invertebrate; but amphibians and reptiles among the vertebrate appear at the close.

Mesozoic Time.

The Period of Middle Life Forms: Flowering trees increasing in number and importance. Deciduous trees make their appearance. Animal life largely reptilian. The class Mammalia represented by marsupials.

Cenozoic Time.

Tertiary, or Age of Mammals: Eocene, Miocene, Pliocene.

Quarternary, or Age of Man: Glacial or Pleistocene, Recent.

At the close of the Mesozoic time, great elevations of land took place in both America and Europe, especially in the northern portions. This could not fail to have a great effect on life, both animal and vegetable.

During the Eocene, or first division of the Tertiary Age, we have simply to note the steady progress of life. There were forests of species of oaks, poplars, maples, hickories, and other common trees, and others now found only in tropical

regions. Palm trees were growing in the upper Missouri region of the United States. And England was decidedly a land of Palms, as no less than thirteen species are known to have been growing there. Cypresses, yews, and pines graced the scene.
Our special interest centers, however, in the mammals of this epoch.

Illustration of The Paleotherium.--------

In the preceding epoch marsupials only were represented. But in beds of the middle and closing portions of the Eocene period we meet with a sudden increase of Mammalian life. Whale-like animals were especially abundant in the seas; and on our Western plains were animals like the tapirs of India, and rhinoceros-like animals as large as elephants but having no trunks, and diminutive little animals not larger than foxes, from which have come our horses. Europe also had a varied Mammalian fauna. There were numerous hog-like animals. Animals, like the tapirs of tropical Asia and America, wandered in the forests and on the banks of the rivers. Herds of horse-like animals, about the size of Shetland ponies, fed on the meadows. Animals that chew the cud were present, or at least had near representatives.

Among the flesh-eating animals were creatures resembling foxes, wolverines, and hyenas. This shows what a great advance had been made. But, besides all these, we are here presented with representatives of the order of Quadrumana, or four-handed animals. Several genera of lemurs are found in both America and Europe.

Now the Quadrumana are the order below man. Therefore it seems that in the Eocene period, all the forms of life *below* man are represented. The time seems to be at hand when we can look, with some confidence, for traces of the presence of man himself. We must therefore be more cautious in our investigations.

The epoch following on after the Eocene is designated as the Miocene. We must remember that, though recent in a geological sense, yet it is immensely remote when measured by the standard of years. We must inquire into all the surroundings of this far away time. The geographical features must have been widely different from the present.

In the first place, the elevation of land to the north must have

been sufficient to have connected the land areas of the Northern Hemisphere--North America, with Asia and Greenland; and this latter country must have been united with Iceland, and, through the British Islands, with Europe. But, to compensate for this land mass to the north, large portions of Central and Southern Europe were beneath the waves. The proof of this extended mass of land is to be found in the wide distribution of similar animals and plants in the Miocene time. All the chief botanists are agreed that the north Polar region was the center from which plants peculiar to the Eocene and Miocene epochs spread into both Europe and America. We may mention that the famous big trees of California are simply remnants of a wide-spread growth of these trees in Miocene times. They can be found in a fossil state at various places in British America, in Greenland, and in Europe. They are supposed to have originated somewhere in the north, and spread by these land connections we have mentioned into both Europe and America. But this is not the only tree that grew in the Miocene forests of both continents. The magnolia, tulip-tree, and swamp cypress are other instances.

Eleven species, growing in the Rocky Mountain regions in Rocene times, found their way to Europe in the Miocene times, driving before them the plants of a tropical growth that had hitherto flourished in England. Now this implies land connection

between the two continents. Furthermore, animals both large and small are found common to the two countries. The climate over what is now the North Temperate Zone, and even further. north, must have been delightful. There is ample testimony to this effect in the rich vegetative remains over wide areas.

In Spitzbergen, within twelve degrees of the pole, where now a dwarf willow and a few herbaceous plants form the only vegetation, and the ground is most of the time covered with snow and ice, there were growing, in Miocene times, no less than ninety-five species of trees, including yews, hazels, elders, beech, elms, and others. But it is in the Miocene forests of the continent of Europe where we meet with evidence of a singularly mild climate.

There were at least eleven species of palms growing in Switzerland; and one variety of them grew as far north as Northern Germany.

We can not give a list of all the species. On the one hand, there were elms, willows, poplars, oaks, and beeches, thus far similar to the forest growth of temperate regions. Mingled with these were forests of trees like the tulip-tree, swamp cypress,

and liquid amber or sweet gum of the southern part of the United States--plants whose home is in the warm and moist regions of the earth. But there were also representatives of the tropical regions--such as fig-trees, cinnamon-trees, and camphor-trees: these are found growing now in tropical countries. Fruit-trees of the cherry, plum, and almond species were also to be seen. Prof. Heer points out how all this should convince us that a large part of Europe, in the Miocene Age, possessed a climate not unlike that of the Madeira or Canary Islands to-day. He calls especial attention to the fact that these trees were nearly all of evergreen species, and that a severe winter would destroy them. He finds one hundred and thirty-one species of the Temperate Zone--species that can stand a moderate amount of cold, but not very hot and dry climates. He finds eighty-five species of tropical plants that could not possibly live where the Winters are severe. Mingled with these were nearly three hundred species whose natural home is in the warm, temperate portions of the earth. The only way you can explain this motley assemblage of trees is, to suppose that in what is now Europe was a climate free from extremes, allowing the trees to put forth flowers and fruits all the year round. "Reminding us," says Prof. Heer, "of those fortunate zones where Nature never goes to rest."

Illustration of Miocene Mammals.----------

Let us now inquire as to the animals that roamed through these great forests we have been describing. The Miocene period extended over a long lapse of time, and considerable change took place among the animals belonging to the different parts of this age. We will only give a general outline for the whole period. The marsupials lingered along into the early stages of this period, and then disappeared from Europe. The rhinoceros were present in the early stages, and continued through the entire age. We meet in this period animals of the elephant kind, two species, the mastodon and deinotherium. Antelopes and gazelles wandered in vast troops over the plains of Hungary, Spain, and Southern France. Carnivorous animals resembling tigers and hyenas found abundance of animal food. Herds of horse-like animals fed on the rich herbage of the meadows. The birds were largely represented. In the woods were to be seen flocks of gayly feathered paroquets and trogons. On the plains secretary-birds hunted the serpents and reptiles, which furnished them food--and eagles were on the watch for their prey. Cranes waded in the rivers for fish. Geese, herons, and pheasants must have

been abundant.

Our main interest centers in the order Quadrumana. We must remember that this order appeared in the Eocene. Several species were present in the Miocene. They wandered in the forests of France, Switzerland, Germany, and Italy, and doubtless found abundant food in the figs and bread-fruit, walnuts, almonds, dates, and other nuts growing there. One of the most important is regarded as belonging to the same genus as the Gibbons. This is the genus which has been sometimes regarded as making a nearer approach to man than any other monkey. Others, however, consider it as belonging to an extinct family. In addition to this species there were at least three other species: thus there was no absence of simian life in the Miocene.

From the sketch we have thus far drawn of the Miocene Age, it seems to have been a very favorable one in every respect. One writer affirms, that "the world never experienced a more beautiful period." And indeed it seems as if the facts bear out this statement. A genial, temperate climate was the rule, even to high northern latitudes. We need not doubt but that there were grassy plains, wooded slopes, and rolling rivers. Was man

present to take advantage of all these favorable surroundings? Did he wander through the evergreen forests, and hunt the deer, antelope, and hogs--the hipparions, and mastodons, and deinotheres--then so numerous? We know of no inherent improbability of his existence at that time. An ape belonging to a highly organized genus was then living in Europe. Every condition considered necessary for the primeval Garden of Eden was then satisfied. Let us stop for a minute and examine the nature of the evidence considered sufficient to prove the presence of man during any of the past geological ages.

Should we be so fortunate as to find portions of the bones of the human skeleton in a geological formation in such positions that they could not possibly have been introduced there since the deposition of the containing bed, it would of course prove that man was at least as old as the formation itself. But it happens that human remains in beds of a previous geological age are very rare. Indeed, human remains in formations of the Pleistocene Age, during which we have ample testimony, as we shall see, of the presence of man, are very rare. The cases in which there can be no doubt can he reckoned on the fingers. The explanation of this state of things is not at all difficult, for it is only under very rare circumstances that portions of

the bones of animals even larger than man are preserved to us in geological strata. Vast numbers die and vanish away without leaving a trace behind them for every fragmentary bone we recover. In the case of man we must remember that, in previous eras, he was present in very small numbers; that, owing to his intelligence, he would not be as liable to be drowned and swept away, and so mingle his remains with beds of river detritus then forming, as were animals. Mr. Lyell has made some remarks on the draining of the Haarlem Lake by the government of Holland in 1853, which shows that even favorable circumstances do not always preserve remains for future inspection. Though called a lake, this body of water was an arm of the sea, covering about forty-five thousand acres. The population which had lived on the shores of the lake was between thirty and forty thousand souls. "There had been many a shipwreck, and many a naval fight on those waters, and hundreds of Dutch and Spanish soldiers and sailors had met there with a watery grave," yet not a solitary portion of the human skeleton was to be found in its bed.

Thus we see that, in the majority of cases, we must rely on other evidence than the presence of human bones to prove the existence of man in the geological periods of the past. In the case of the Haarlem Lake again, there was found the wreck of one or two vessels, and some ancient armor. So, had it been a

disputed point whether man was a denizen of this planet at the time when the area in question was covered by water, it would have been settled beyond a doubt by these relics of his industry, even though portions of the human frame itself were entirely wanting. And, in reality, proofs of this nature are just as satisfactory as it would be to discover human bones. If, on a desert island, we find arrow-heads, javelins, a place where there had been a fire, split bones, and other *debris* of a feast, we are as much justified in asserting that man had been there, as we would be had we seen him with our own eyes. In the same manner, if we detect in any strata of the past any undoubted products of human industry--such as weapons, or implements and ornaments--in such position that we know they could not have been deposited there since the formation of the bed itself, we have no hesitancy in asserting that man himself is of the same antiquity as the strata containing the implements. In the great majority of cases, this is the only kind of evidence possible to advance.

It is now well known that the first stage in the culture of any people, is what is called the Stone Age. That is to say, their weapons and implements were made from stone, or at least the majority of them were. We will discuss on another page this

point, and also the grounds leading us to infer that many of the extremely rude forms are really the work of man.

Let us now return to the Miocene Age, in which we are to seek for the presence of man. In 1867 a French geologist, by the name of Bourgeois, who had been searching some beds of the Miocene Age, near Thenay, France, found a number of flints of such a peculiar shape, that he concluded they could only be explained by supposing that man formed them. In this case there is to question as to the age of the stratum containing the flints. All geologists are agreed that it is of the Miocene Age. The question then is, whether the flints were artificially cut or not. On this question there has been a great division of opinion, and we can not do better than to examine and see where the Principal scientific men stand on this point.

In 1872, at the scientific congress in Brussels, this question was referred to a committee composed of the most competent men from the different countries of Europe. We are sorry to say that, after a thorough consideration of them, the judges were unable to agree. Some accepted them, others rejected them, and still others were undecided. Some of the latter have since become convinced by recent discoveries.

Since this discovery, similar specimens have been described as having been found in Portugal, and from another locality in France. Some men of the highest authority accept these flints as proving the presence of man in Miocene times. This is supported by such men as Quatrefages, Hamy, Mortillet, and Capellini. These are all known to be competent and careful geologists. Another class does not think the evidence strong enough to declare these flints of human origin, and so do not think it proved that man lived in Europe in Miocene times; but do believe that we will eventually find proofs of his existence during that era in the warm and tropical regions of the globe. This is the view of such men as Lubbock, Evans, Huxley, and Winchell. Still others say that, during the vast lapse of years since Miocene times, all the species of land mammals then alive have perished--their place being taken by other species--and therefore it is incredible that man, the most highly specialized of all animals, should have survived. And hence, if these Thenay flints are really artificial in their origin, it is more reasonable to suppose they were cut by one of the higher apes, then living in France, than by man. This is the view of Prof. Dawkins and Prof. Gaudry. As to the last view, it is surely but reasonable to suppose, with Quatrefages, that the

superior intelligence of man would serve to protect him from the operation of causes that would effect the extinction of lower animals. Hence, unless some evidence be produced to show that species of apes are known to make rude stone implements, or some evidence that they did this in past ages, we must believe, with Geikie and others, that these flints prove that Miocene man lived in France, unless indeed we refuse to believe that they are artificial.

It also seems to us that those who hold to the view that man was living in other parts of the world, as Asia, during the Miocene Age, ought readily to admit that a few wandering bands might penetrate into Europe. The climate was tropical, there was an abundance of animal life, and, if man was living anywhere, it is very reasonable to suppose that, at some epoch during the course of the Miocene Age, he would have found his way to Europe, unless shut off by the sea. It therefore seems to us that the presence of those cut flints is conclusive of the presence of man in Europe during the Miocene Age. At the same time we can not affirm that this is the conclusion of the scientific world. They seem to have heeded the remark of Quatrefages, that "in such a matter there is no great urgency," and are waiting for further discoveries.

Thus far in our review we have noticed the steady progress in the forms of life. In the Miocene Age we have seen all the types of life below man present, and some indications of the presence of man himself. We must now learn what we can of the Pliocene Age, the last division of the Tertiary Age.

The Pliocene Age need not detain us long. Considerable changes in the geography of both Europe and America were going forward during the Miocene Age, and the result was quite a change in climate. There was a steady elevation of the Pacific coast region of America, and, as a consequences a period of great volcanic outbursts in California and Oregon. At the same time the bridge connecting Asia and America was severed. In Europe the Mediterranean area was elevated; but the land connecting Greenland with Europe sank, allowing the cold waters of the Arctic to communicate with both the North Sea and the Atlantic--England at that time forming part of the great peninsula extending north and west from Europe. The climate during the Pliocene Age was cooler than that of the Miocene. This is marked in the vegetation of that period. The palms and the cinnamon trees, which in Miocene times grew in Germany, flourished no farther north than Italy during the Pliocene.

Count DeSaporta, who made special researches in the flora of this period, found the remains of a forest growth buried under lava on the side of a mountain in Cantal France, at an elevation of about four thousand feet above the level of the sea. This consisted principally of pines. This shows that probably all Northern Europe was covered with somber forests of pine. In the same section he found, buried under volcanic ash, a vegetation consisting mostly of deciduous trees--maples, alders, poplars, willows, elms, and ashes. As this was growing at the height Of about twenty-three hundred feet in Cantal France, it probably represents the vegetation of Britain and Northern Germany. Finally, the vegetation of Central and Southern France, as well as Northern Italy, was intermediate in character between the luxuriant evergreen forests of the Miocene Age and that now growing there. The tropical character of the vegetation was evidently passing away. The climate over a large part of Europe was now temperate, though probably warmer than at present.

In the Mammalia we have to notice the disappearance of some species, and the arrival and spread of some others. The apes living as far north as Germany in the Miocene Age were restricted to Southern France and Italy in the Pliocene, and, at

its close, vanished altogether from Europe. The first living species of mammals is found in the remains of the hippopotamus that frequented the rivers of Pliocene times. The mastodon of Miocene times was still to be seen, but along with it was a species of true elephants. The hipparion survived into this epoch, but the horse also makes its appearance. Great quantities of deer roamed over the land; and, as might be expected where they were so abundant, the carnivorous animals allied to the bears and wolves, panthers, linxes, and tigers, were also to be found. "At night," says Mr. Dawkins, "the Pliocene forests of Central France echoed with the weird laughter of the hyena."

The gradual lowering of the climate is also shown by the remains of the mollusks deposited in beds of marine or sea formation during different eras of this age. It is found that the earlier the bed, the more southern mollusks are found in it. This shows us that, all through the Pliocene Age, the waters of the seas surrounding England were gradually growing cooler, thus compelling the retreat of those mollusks fitted only for a warm climate, and allowing a gradual increase in those species fitted for cold or northern latitudes. We also find, in deposits made near the close of Pliocene times, numbers of stone which show all evidence of having been borne thither by means of ice. So we

may conclude that rafts of ice came floating down the North Sea during the closing period of the Pliocene Age. Still, during the entire length of the Pliocene Age, Europe certainly offered an inviting home for man. Not only were the higher orders of animals present, but at least one living species was known. We find more proofs of his presence, but whether they are sufficient to convince us that man really lived during that epoch is to be seen.

Prof. Whitney has brought to the attention of the scientific world what he considers ample evidence of the presence of Pliocene man in California. We reserve this for discussion in another place. We will only remark, at present, that the evidence in this case is regarded as sufficient by some of the best of American Scholars. We simply mention them here, so that they may be borne in mind when we see what evidence Europe has to offer on this point. In 1863, M. Desnoyers, of France, discovered, in a stratum which he considered Pliocene, some bones of elephants and other animals cut and scratched in such a manner that he considered the cuts to be the work of man. As showing how cautious geologists are of accepting such conclusions, we mention this case. There was found in the same bed the remains of an extinct beaver. The question was at once

raised, whether rodents by gnawing these bones could not have produced the cuts in question. Sir Charles Lyell, by actual experiments in the Zoological Gardens in London, soon showed that this was probably the fact. Yet Sir John Lubbock thinks it quite likely some of them were of human origin.
Subsequently, however, M. Bourgeois discovered in the same bed worked flints, about the human origin of which there seems to be no doubt; but a more careful study of the formation in which they occur has raised questions as to its age. Though usually held to be Pliocene, some careful observers consider it to be of a later age. Geologists can not be accused of rashly accepting statements as to the antiquity of man.

In 1867 there was discovered, in Northern Italy, a human skull in a railway cutting at a depth of nearly fifty feet.
This stratum contains remains of several Pliocene animals.
This is held to prove the existence of Pliocene man by several eminent observers, amongst others Prof. Cocchi, of Italy, and Forsyth Major. But in this case Mr. Dawkins contends that it was not found under such conditions as render it certain that the stratum had been undisturbed, and so does not prove to a certainty that it was of the same age as the stratum.
And Mr. Geikie thinks that the stratum itself is of a later age

than the Pliocene. It is but right that geologists should thus carefully scan all the evidence produced.

Illustration of Cut on Bones of a Whale from Pliocene Deposit.-

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In 1876 Prof. Capellini discovered, in a Pliocene deposit in Italy, the bones of a whale, which were so marked with cuts and incisions that he thought the only explanation was to say they had been cut by men. In this case there is no dispute as to the age of the stratum. Neither is there much doubt but that the cuts are the work of man. It is quite true that Mr. Evans has suggested that they may be the work of fishes. In this he is followed by Prof. Winchell. But there appears to be little ground for such belief, because the cuts are all on the outside faces of rib-bones, and the outer faces of the backbones. From the position occupied by the remaining portions of the skeleton, Prof. Capellini is sure that the animal had run aground, and, in that condition, was discovered and killed by men, who then, by means of flint knives, cut away such portions of food as they wished. It must have been lying on its left side, since the cuts were all made on bones of the right. It is not probable that fishes would have been apt to choose the

outside faces of the ribs on the right side for their meals. These cut bones have been carefully examined by many competent men, who have agreed with Capellini that they are the work of men. Mr. Dawkins thinks the cuts were artificial, but he says, "It is not, however, to my mind satisfactorily shown that these were obtained from undisturbed strata." Now these bones have been found in several localities, always in Pliocene deposits, which formed the shores of the Pliocene sea. Knowing how carefully geologists inquire into all the surroundings of a find, surely, if Capellini and others are the competent men they are admitted to be, they would have informed us long ago if they were not found in undisturbed strata.

Mr. Dawkins also objects because fragments of pottery were found in the strata. "Pottery," says he, "was unknown in the Pleistocene Age, and therefore is unlikely to have been found in the Pliocene." Mr. Geikie says this objection is founded on a mistake, as Prof. Capellini told him the pottery was found lying on the surface, and was never for a moment imagined by him as belonging to the same age as the cut bones. There is also the objection, that, inasmuch as all the mammals then alive except one have perished, it is more than likely that, had man been in existence then, he too would

have disappeared.

We considered this point fully when speculating as to the presence of man in the Miocene: so we have nothing further to offer. We might, however, suggest that, if the hippopotamus amongst mammals could survive all the changing time since the Pliocene, as it has done, it seems no more than fair to admit equal power of endurance to the human species. The position then of the scientific world as to the Pliocene Age of man is, on the whole, more decided in its favor than for the Miocene Age. Quite a number of eminent scholars, whose conclusions are worthy of all respect, unhesitatingly affirm the existence of Pliocene man in Europe. Others are not quite ready to admit his existence in Europe, but do think he was in existence elsewhere. Still others, with all due respect for the discoveries of Capellini, think it more prudent to await further discoveries. The reader, who has followed us through this brief outline of the past, can join which of the classes he will, and be sure of finding himself in good company.

This completes our review of past geological ages. With the termination of the Pliocene Age we find ourselves on firmer ground. We only wish to call attention once more to the gradual

unfolding of life. We see that the rule has been that everywhere the lower forms of life precede the higher. In the plant world flowerless plants precede the flowering ones. The coal we burn to-day is mainly the remains of the wonderful growth of the flowerless vegetation of the Paleozoic Ace. When flowering plants appear, it is the lower forms of them at first.

It was long ages before trees with deciduous leaves appeared. The growth of animal life is equally instructive.
First invertebrate life, then the lowest forms of vertebrate life. The fishes are followed by amphibians--then reptiles, then birds. The first mammal to appear was the lowest organized of all--the marsupials. And we have seen the sudden increase of mammalian life in Tertiary times. We notice, in all the divisions of life, a beginning, a culmination, and a decline.
There has never been such a growth of flowerless plants as in the Paleozoic, and flowering plants probably culminated in the Miocene. The same rule holds good for the animal world also. As man is the most highly organized of all the animals, we can not hope to find any evidence of his presence until we find proofs of the presence of all the lower types of life. Of course future discoveries may change our knowledge when the series is complete; but, from our present stand-point, he could not have

lived before the Miocene Age, and we have seen how faint and indecisive are the proofs of his presence even then. But should it finally be proved, beyond all dispute, that man did live in the Miocene Age, we must observe that this is but a small portion, but a minute fraction, of the great lapse of time since life appeared on the globe. We are a creation of but yesterday, even granting all that the most enthusiastic believer in the antiquity of man can claim.

Illustration of The Mastodon.----------

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(1) The manuscript of this chapter was submitted to Prof. Winchell, of the University of Michigan, for criticism.

(2) Dana's "Manual of Geology," p. 146.

(3) Ibid. p. 147.

(4) Nicholson's "Manual of Zoology," p. 59.

(5) Dana's "Manual of Geology," p. 74.

(6) Nicholson's "Manual of Zoology," p. 42.

(7) Dana's "Manual of Geology," p. 323.

(8) Nicholson's "Zoology," p. 402.

(9) Dana's "Geology," p. 302.

(10) Dawkins's "Early Man in Britain," p. 6.

(11) Dana's "Geology," p. 382.

(12) Haywood's, Heer's, "Primeval World of Switzerland."

(13) Dana's "Man. Geology," p.395.

(14) Nicholson's "Man. Zoo1ogy," p.42.

(15) Marsh: "American Assoc. Rep.," 1877.

(16) Marsh: "American Assoc. Rep.," 1877.

(17) Dawkins's "Early Man in Britain," p. 6.

(18) Nicholson's "Manual of Zoology," pp. 419 and 504.

(19) When we talk of first appearance, we mean the discovery of remains. All who believe in the doctrine of evolution, know that the class Mammalia must have appeared early in Paleozoic times. Thus, Mr. Wallace says, "Bats and whales--strange modifications of mammals--appear perfectly well developed in the Eocene. What countless ages back must we go for the origin of these groups--the whales from some ancestral carnivorous animal, the bats from the insectivora!" and even then we have to seek for the common origin of these groups at far earlier periods. "So that, on the lowest estimate, we must place the origin of the Mammalia very far back in Paleozoic times." ("Island Life," p. 201.)

(20) This word is also spelled Kainozoic, and Cainozoic.

We follow Dana, p. 140.

(21) Dana, "Manual of Geology," p. 488.

(22) Dawkins's "Early Man in Britain," p. 28.

(23) Many of these animal forms were common during the early Eocene. (Winchell.)

(24) Dawkins's "Early Man in Britain," p. 29.

(25) Dana, "Geology," p. 517.

(26) Dawkins's "Early Man in Britain," p. 32.

(27) Marsh. "American Assoc. Rep.," 1877.

(28) Haywood's Heer's "Primeval World of Switzerland," p. 296.

(29) Dawkins's "Early Man in Britain," p. 20.

(30) Ibid., p. 43.

(31) Dana's "Manual of Geology," p. 498.

(32) Dawkins's "Early Man in Britain," p. 42.

(33) Dana's "Manual of Geology," p. 514.

(34) Haywood's Heer's "Primeval World of Switzerland," p. 334.

(35) Haywood's Heer's "Primeval World of Switzerland."

(36) Dawkins's "Early Man in Britain," pp. 57 and 64.

(37) Ibid., p. 57: also, Haywood's Heer's "Primeval World of Switzerland."

(38) Nicholson's "Manual of Zoology," p. 605.

(39) Dawkins's "Early Man in Britain," p. 58.

(40) Ibid. 58.

(41) McLean: "Mastodon, Mammoth, and Man," p. 67.

(42) Dawkins's "Early Man in Europe," p. 66.

(43) See "Outline," p. 41.

(44) Lyell's "Antiquity of Man," p. 193.

(45) Quatrefages's "Human Species," p. 151.

(46) Prof. Winchell says: "Quatrefages does not now consider the proof decisive (*Hommes Fossiles et Hommes Sauvages*, Paris, 1884, p. 95)." He cites, as agreeing with him, MM. Cotteau, Evans, "and, I believe, most of the members who have not publicly pronounced themselves."

(47) Dawkins's "Early Man in Britain," p. 67.

(48) Dawkins's "Early Man in Britain," p. 68.

(49) "Human Species," p. 152.

(50) Prof. Winchell remarks that, though some savage races might have been living in tropical lands during the Miocene, still the oldest skull and jaws obtainable in Europe are of a higher type than these.

(51) Dana's "Manual of Geology," p. 523.

(52) Marsh: "American Assoc. Rep.," 1877.

(53) Dawkins's "Early Man in Britain," p. 73.

(54) Ibid., p. 78.

(55) Dawkins's "Early Man in Britain," p. 77.

(56) Dawkins's "Early Man in Britain," p. 76.

(57) Winchell's "Pre-Adamites," Whitney's "Auriferous Gravels of California," Marsh's "Address before American Assoc.," 1879.

(58) "Antiquity of Man," p. 234.

(59) "Prehistoric Times," p. 433.

(60) Geikie's "Prehistoric Europe," p. 343.

(61) Dawkins's "Early Man in Britain."

(62) Ibid.

(63) "Prehistoric Europe," p. 318.

(64) Quatrefages's "Hum. Species," p. 150; Geikie's "Prehistoric Eur.," p. 345.

(65) "Pre-Adamites."

(66) Geikie's "Prehistoric Europe," p. 344.

(67) Ibid.

(68) "Early Man in Britain," p. 92.

(69) Geikie's "Prehistoric Europe," p. 344.

(70) Same as Glacial. See "Outline," p. 41.

(71) "Early Man in Britain," p. 92.

(72) "Prehistoric Europe," p. 345, note 2.

END OF CHAPTER II**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Chapter III

MEN OF THE RIVER DRIFT.

Beginning of the Glacial Age--Inter-glacial Age--Man living in Europe during this age--Map of Europe--Proof of former elevation of land--The animals living in Europe during this age--Conclusions drawn from these different animals--The vegetation

of this period--Different climatic conditions of Europe during the Glacial Age--Proofs of a Glacial Age--Extent of the Glacial Ice--Evidence of warm Inter-glacial Age--The primitive state of man--Early English civilization--Views of Horace--Primitive man destitute of metals--Order in which different materials were used by man for weapons--Evidence, from the River Somme--History of Boucher de Perthes's investigations--Discussion of the subject--Antiquity of these remains--Improvement during Paleolithic Age--Description of the flint implements--Other countries where these implements are found--What race of men were these tribes--The Canstadt race--Mr. Dawkins's views--When did they first appear in Europe--The authorities on this question--Conclusion.

The Tertiary Age, with its wonderful wealth of animal and plant life, gradually drew to its close. In our "Outline" we have named the period that next ensued the Glacial Age. This was sufficiently exact for our purpose then, but we must remember this is the name for a long series of years. During this period great changes in climate occurred. At its commencement, a genial temperate climate prevailed throughout Europe; and this, as we know, was preceded, during the Miocene Age, by a warm tropical one. This succession, then, shows us that, for some

reason or other, the climate had been gradually growing colder. This change went forward uninterruptedly. Doubtless very gradually, from century to century, the seasons grew more and more severe, until, finally, the Summer's sun no longer cleared the mountains of the Winter's snow. This was the beginning of the Glacial Age proper.

The best authorities also suppose that the reign of snow and ice was broken by at least one return (possibly more) of genial climate, when animals and plants from the south again visited the countries of Northern Europe--only, however, to be once more driven forth by a return of arctic cold. But finally, before the increasing warmth of a genial Climate, the glaciers vanished, not to return again, and the Glacial Age became merged in that of the present.

It is no longer a question that man lived in Europe during the largest portion of this age, if not from the beginning. It is necessary, then, to come to a clear understanding of the successive stages of this entire age, and to trace the wonderful cycles of climate--the strange mutation of heat and cold, which must have exerted a powerful influence on the life, both animal and vegetable, of the period--and see when we first find

decisive proofs of man's presence, and learn what we can of his condition.

The map of Europe, at the close of Pliocene times and the commencement of the Glacial Age, is of interest to us in several ways. From this it will be seen that it was considerably more elevated than at the present. As this is no fancy sketch, but is based on facts, it is well to outline them. Without the aid of man, land animals can not possibly pass from the mainland of a continent to an island lying some distance off the shore. But it is well known that animals like the rhinoceros, and several others, wandered as well over the surface of the British Islands as on the adjacent coast of Europe. We are therefore compelled to assume, that at that time the English Channel and the Irish Sea were not in existence. This necessitates an elevation of at least four hundred feet, which would also lay bare a large portion of the North Sea. In proof of this latter statement is the fact, that, at a distance from land in the North Sea, fishermen at the present day frequently dredge up bones and teeth of animals that then roamed in Europe.

Map of Europe----------

While there is no necessity for supposing an elevation greater than that required to lay bare a passage for animals back and forth, yet soundings undertaken by the British government have established the fact, that the ocean deepens very gradually away from the shores of the main-land until a depth of six hundred feet is reached, when the shore falls away very suddenly. This is supposed to be the sea-coast of that time. The English Channel would then have existed as the valley of the Seine, and the Rhine have prolonged its flow over the present bed of the North Sea. As the land stood at this height through a large portion of the Glacial Age, it is not at all unreasonable to suppose that primitive tribes hunted back and forth along these valleys, and so doubtless many convincing proofs of their presence at that early day lie buried underneath the waves of the sea. In like manner, at the south, we know that elephants, lions, and hyenas passed freely from Africa to Spain, Italy, and the Island of Crete, and, consequently, the Mediterranean Sea must have been bridged in one or two places at least.

The change from Pliocene times to early Glacial was so gradual that quite a number of animals lived on from one to the other,

and, as we have already stated, one of these species has even survived to our own times.

But we note the arrival in Europe of a great number of new animals, and the diversity of species seems at first an inexplicable riddle. The key, however, is to be found in the great climatic changes, which we have already mentioned as occurring during this age. On the one hand, we find such animals as the musk-sheep, reindeer, and arctic fox, animals whose natural home is in high northern latitudes, where snow and ice prevail most of the year. Yet during this age they lived in Southern France and Italy, which must then have had a far different climate than that at present.

Were we to confine our attention to these alone we would be convinced that the climate of Europe at that time was arctic in its severity. But side by side with the remains of these animals are found others which imply an altogether different climate. The hippopotamus, now frequenting the rivers of Africa, during that period roamed as far north as Yorkshire, England. This animal could not live in a country where the cold was severe enough to form ice on the rivers. The remains of a number of other animals are found whose natural home is in the warm

regions of the earth. These two groups of animals, one from the north and one from the south, show how varied was the climate of Europe during the Glacial Age.

In addition to these, there was also a large number of animals whose home is in the temperate regions of the earth--animals that thrive in neither extremes of heat and cold. This includes a great many animals of the deer kind, several varieties of bears and horses; in fact, the majority of those with which we are acquainted.

Now, what conclusion follows from this assemblage of animals? Many theories have been put forward in explanation. It has been suggested that Europe at that time had a climate not unlike that of some portions of the earth at present; that is, a long and severe Winter was followed by a short but warm Summer. During the Winter reindeer and other northern animals would press from the north in search of food, but would retire on the approach of Spring, when their feeding grounds would in turn be occupied by bisons and animals of a southern habitat.
In confirmation of this view it is pointed out that a vast collection of bones, from the bottom of a sink-hole or pond in Derbyshire, England, conclusively show that in the summer-time

it was visited by bisons with their calves, and in Winter by reindeer. This theory is open to a great many objections. As is well known, some animals make quite extensive migrations annually, but we can scarcely believe that heavy, unwieldy animals like the hippopotamus, were then such industrious travelers as to wander every year from Italy to Northern England and return. But the very ground on which this theory rests, that of strongly contrasted summers and winters, could not be true of Europe or the western portions of it, owing to the presence of the Atlantic Ocean, and the influence which it inevitably exerts on the climate. We see, then, that the presence of these different animals can be explained only by supposing great secular changes in climate. Let us see if we can strengthen this view by an appeal to the vegetation of this period.

We have seen how important a guide as to climate were the remains of the vegetation of the early times. We therefore turn with more confidence to such discoveries as will tell us of the flora of this age. But there are many reasons why remains of plant growth should be few. As we shall soon learn, this was a period of flooded rivers; and in the gravels and loams thus formed is found our principal source of information as to the

life of the age. But such a rush of waters would form gravelly banks or great beds of loam, and would sweep any plants which might be washed into its floods far out to sea; or if by chance they should become buried in such gravel beds, the action of water would speedily cause the decay of the tender portions, such as leaves, bark, and soft wood, in which case no profitable investigation could be made. Occasionally, however, around the shores of old lakes, vegetable beds have been buried, and we know that some mineral springs deposit a sort of protecting sediment on every thing with which they come in contact. By such means, at rare intervals, leaves, seeds, and fruits have been sealed up for future inspection, and from a careful study of all such instances much valuable information has been obtained. At one place in the valley of the Seine was discovered, under a bed of tufa, the remains of a forest growth. It is not doubted that the deposit belongs to the Glacial Age.

Yet the forest growth reminds us of that prevalent during the Miocene Age. The fig-tree, canary, laurel, and box-tree grew in profusion. These are all southern forms. One severe winter would kill them all, and even hard frosts would prevent the ripening of their fruits.

Neither were the Summers hot and dry. This is shown by the presence of numerous plants which can not thrive in hot and dry localities, but live in the shady woods of Northern France and Germany. The evidence of this forest growth surely presents us an inviting picture of Europe during a portion of the Glacial Age.

We are not without evidence, also, of a much more severe climate. In a lignite bed (a species of coal) found in nearly the same latitude as the forest growth just mentioned, we detect the presence of trees that grow only in cold northern climates, such as birch, mountain pine, larch, and spruce. And in some peat-bogs of Southern Europe belonging to this age are found willows now growing only in Spitzbergen, and some species of mosses that only thrive far to the north. It is quite evident that this deposit testifies to an altogether different climate from that indicated by the deposit before mentioned. No theory of migration can explain this assemblage of plants, unless it be migration taking place very slowly, in consequence of an equally slow change of climate.

From what we have just learned of the animals and plants living in Europe during this age, we can frame some conception of the

different climatic conditions of Europe. On the one hand, we have a country with a mild and genial climate. Trees of a warm latitude were then growing as far north as Paris, and we may well suppose Europe to have abounded in shady forests and grassy plains, through which flowed large rivers. It was just such a country as that in which elephants and southern animals would flourish, while vast herds of deer and bovine animals wandered over the entire length and breadth of the land. Where animal life was so abundant there were sure to be carnivorous animals also, and lions, hyenas, tigers, and other animals added to the variety of animal life.

This, however, is but one side of the picture. The other presents us with a very different scene; instead of an abundant forest growth, the land supported only dwarf birch, arctic willows, and stunted mosses. Arctic animals, such as musk-sheep and reindeer, lived all the year around in Southern France. The woolly mammoth lived in Spain and Italy. In short, the climate and conditions of life were vastly different in the two stages.

We must now turn our attention to the proofs of glaciers in Europe, the phenomena from which this age derives its name.

Descriptions of Alpine glaciers are common enough, but as glaciers and the Glacial Age have a great deal to do with the antiquity of man, we can not do better than to learn what we can of their formation, and their wonderful extension during this period. The school-boy knows that by pressure he gives his snowball nearly the hardness of ice. He could make it really ice if he possessed sufficient strength. The fact is, then, that snow under the influence of pressure passes into the form of ice. In some cases nature does this on a large scale. Where mountains are sufficiently elevated to raise their heads above the snow line we know they are white all the year around with snow. What is not blown away, evaporated, or, as an avalanche, precipitated to lower heights, must accumulate from year to year. But the weight pressing on the lower portions of this snow-field must soon be considerable, and at length become so great, that the snow changes to the form of ice. But as ice it is no longer fixed and immovable. We need not stop to explain just how this ice-field moves, but the fact is that, though moving very slowly, it acts like a liquid body. It will steal away over any incline however small, down which water would flow. Like a river it fills the valleys leading down from the mountains. But, of course, the lower down it flows the higher the temperature it meets, and it will sooner or later reach a

point where it will melt as fast as it advances. This stream of ice flowing down from snow-clad mountains is called a glacier. Those we are best acquainted with are but puny things compared with those of the polar regions, where in one case a great river of ice sixty miles wide, flowing from an unknown distance, some thousands of feet in depth (or height), pours out into the sea.

We at once perceive that such a mass of ice could not pour down a valley without leaving unmistakable signs of its passage. The sides of the mountains would be deeply scarred and smoothed. Projecting knobs would be worn away. The surface of the valley, exposed to the enormous grinding power of the moving ice, would be crushed, pulverized, and dragged along with it. Pieces of stone, like that here represented, would form part of this moving *debris*, and as they were crowded along they would now and then grate over another piece of stone more firmly seated, and so their surface would be deeply scratched in the direction of their greatest length. There is always more or less water circulating under the Alpine glaciers, and the streams that flow from them are always very muddy, containing, as they do, quantities of crushed rock, sand, and clay.

Illustration of Scratched Stone---------

If, for any reason, this earthy matter was not washed out it would form a bed of hard clay, in places packed with these striated stones. Such beds of clay are known as "till" or bowlder clay.

This is descriptive, though in a very general way, of the glaciers as they exist to-day. Geologists have long been aware of the fact that they have convincing proofs of the former presence of glaciers in Northern Europe, where now the climate is mild. The mountains of Scotland and Wales show as distinct traces of glaciers as do those of the Alps. It is not necessary, in this hasty sketch, to enumerate the many grounds on which this conclusion rests. It is sufficient to state that by the united labors of many investigators in that field we are in possession of many conclusions relating to the great glaciers of this age which almost surpass belief; and yet they are the results of careful deductions. The former presence of this ice sheet itself is shown in a most conclusive manner by the bowlder clay formed underneath the great glacier, containing abundant

examples of stone showing by their scratched surface that they have been ground along underneath the glacier. The rocks on the sides of the mountains are scratched exactly as are those in the Alps. By observing how high up on the mountains the striae are, we know the thickness of the ice-sheet; and the direction in which it moved is shown in several ways.

Briefly, then, the geologist assures us that when the cold of the Glacial Age was at its maximum glaciers streamed down from all the mountains of Scotland, Wales, and Northern England; that the ice was thick enough to overtop all the smaller hills, and on the plains it united in one great sea of ice some thousands of feet in thickness, that it stretched as far south as the latitude of London, England. But that to the west the ice streamed out across, the Irish Sea, the islands to the west of Scotland, and ended far out into what is now the Atlantic. But these glaciers, vast as they were, were very small compared with the glaciers that streamed out from the mountains of Norway and Sweden. These great glaciers invaded England to the south-west, beat back the glacier ice of Scotland from the floor of the North Sea, overran Denmark, and spread their mantle of bowlder clay far south into Germany.

While such was the condition of things to the north, the glaciers of the Alps were many times greater than at present. All the valleys were filled with glacier ice, and they spread far out on the plains of Southern Germany and westward into France. The mountains of Southern France and the Pyrenees also supported their separate system of glaciers. Ice also descended from the mountains of Asia Minor and North Africa.
In America we meet with traces of glaciers on a vast scale; but we can not pause to describe them here.

It need not surprise us, therefore, to learn of reindeer and musk-sheep feeding on stunted herbage in what now constitutes Southern France. When a continuous mantle of snow and ice cloaked all Northern Europe, it is not at all surprising to find evidence of an extremely cold climate prevailing throughout its southern borders. We thus see how one piece of evidence fits into another, and therefore we may, with some confidence, endeavor to find proofs of more genial conditions when the snow and ice disappeared, and a more luxuriant vegetation possessed the land, and animals accustomed to warm and even tropical countries roamed over a large extent of European territory.
In Switzerland it was long ago pointed out that after the ancient glaciers had for a long time occupied the low grounds of

that country they, for some cause, retreated to the mountain valleys, and allowed streams and rivers to work over the *debris* left behind them. At Wetzikon most interesting conclusions have been drawn. We there learn that, after the retreat of the glaciers, a lake occupied the place, which in course of time became filled with peat, and that subsequently the peat was transformed into lignite. To judge from the remains of animals and plants, the climate must have been at least as warm as that at present; and this condition of things must have prevailed over a period of some thousands of years to explain the thick deposits of peat, from which originated the lignites.

But we also know that this period came to an end, and that once more the ice descended. This is shown by the fact that directly overlying the lignite beds are alternating layers of sand and gravel, and, resting on these, glacier-born bowlders. The same conclusion follows from the discoveries made at many other places.

In Scotland it is well known that the bowlder clay contains every now and then scattered patches of peat and beds of soil either deposited in lakes or rivers. The only explanation that

can be given for their presence is that they represent old land surfaces; that is, when the land was freed from ice, and vegetation had again clothed it in a mantle of green. In this cut is shown one of these beds. Both above and below are the beds of bowlder clay. The peat in the centre varies from an inch to a foot and a half in thickness, and contains many fragments of wood, sticks, roots, etc.; and of animals, numerous beetles were found, one kind of which frequents only places where deer and ruminant animals abound.

Diagram of Interglacial Bed----------

From a large number of such discoveries it is conclusively shown that, after all, Scotland was smothered under one enormous glacier, a change of climate occurred, and the ice melted away. Then Scotland enjoyed a climate capable of nourishing sufficient vegetation to induce mammoths, Irish deer, horses, and great oxen to occupy the land. But the upper bowlder clay no less conclusively shows that once more the climate became cold, and ice overflowed all the lowlands and buried under a new accumulation of bowlder clay such parts of the old land surface as it did not erode. Substantially the same set of changes are

observed in English and German geology.

Having thus given an outline of the climatic changes which took place in Europe during the Glacial Age, and the grounds on which these strange conclusions rest, we must now turn our attention to the appearance of man.

The uncertainties which hung over his presence in the earlier periods, spoken of in the former chapter, do not apply to the proofs of his presence during this age, though it is far from settled at what particular portion of the Glacial Age he came into Europe. We must remember we are to investigate the past, and to awaken an interest in the history of a people who trod this earth in ages long ago. The evidence on which we establish a history of the early tribes of Europe is necessarily fragmentary, but still a portion here and a piece there are found to form one whole, and enable us to form quite a vivid conception of manners and times now very far remote.

It is not claimed that we have surmounted every difficulty--on the contrary, there is yet much to be deciphered; but, in some respects, we are now better acquainted with these shadowy tribes of early times than with those whose history has been recorded

by the historian's facile pen. He has given us a record of blood. He acquaints us with the march of vast armies, tells us of pillaged cities, and gives us the names of a long roll of titled kings; but, unfortunately, we know little of the home life, the occupation, or of those little things which make up the culture of a people. But the knowledge of primitive tribes, gathered from the scanty remains of their implements, from a thorough exploration of their cavern homes, has made us acquainted with much of their home life and surroundings: and we are not entirely ignorant as to such topics as their trade, government, and religion. We must not forget that this is a knowledge of tribes and peoples who lived here in times immeasurably ancient as compared with those in existence at the very dawn of history.

We must try and form a mental picture of what was probably the primitive state of man; and a little judicious reasoning from known facts will do much for us in this direction. Some writers have contended that the first condition of man was that of pleasing innocence, combined with a high degree of enlightenment, which, owing to the wickedness of mankind, he gradually lost. This ideal picture, however consonant with our wishes, must not only give way before the mass of information

now at our command, but has really no foundation in reason; "or, at any rate, if this primitive condition of innocence and enlightenment ever existed, it must have disappeared at a period preceding the present archaeological investigations."

Nothing is plainer than that our present civilization has been developed from barbarism, as that was from savagism. We need go back but a few centuries in the history of any nation, before we find them emerging from a state of barbarism. The energy and intelligence of the Anglo-Saxon has spread his language to the four corners of the globe; he has converted the wilderness into fruitful fields, and reared cities in desert lands: yet his history strikingly illustrates our point. A century back, and we are already in a strange land. The prominent points of present civilization were yet unthought of. No bands of iron united distant cities; no nerves of wire flashed electric speech.

The wealth of that day could not buy many articles conducive of comfort, such as now grace the homes of the poor. The contrast is still more apparent when we recall another of the countless centuries of the past. England, with Europe, was but just awakening to modern life. Printing had but just been invented. Great discoveries had been made, and mankind was but just beginning those first feeble efforts which were to bring to us our modern comforts. But a millennium of years ago, and the

foundation of English civilization had but just been laid by the union of the rude Germanic tribes of the Saxons and the Angles. Similar results attend the ultimate analysis of any civilization. It was but yesterday that wandering hordes, bound together by the loose cohesion of tribal organization, and possessing but the germ of modern enlightenment, held sway in what is now the fairest portion of the world: and we, the descendants of these rude people, must reflect that the end is not yet--that the onward march of progress is one of ever hastening steps--and that, in all human probability, the sun of a thousand years hence will shine on a people whose civilization will be as superior to ours as the light of day exceeds the mellow glow of a moon-lit night.

If such are the changes of but a few centuries, what must we not consider the changes to have been during the countless ages that have sped away since man first appeared on the scene! The early Greek and Roman writers were much nearer right when they considered primitive man to have been but a slight degree removed from the brute world. Horace thus expresses himself: "When animals first crept forth from the newly formed earth, a dumb and filthy herd, they fought for acorns and lurking places --with their nails, and with fists--then with clubs--and at last

with arms, which, taught by experience, they had forged. They then invented names for things, and words to express their thoughts; after which they began to desist from war, to fortify cities, and enact laws." The learning of modern times leads to much the same conclusion.

It is evident that primitive man must have been destitute of metals; for it requires a great deal of knowledge and experience to extract metals from their ores. In the eyes of savages, the various metallic ores are simply so many varieties of stone--much less valuable for his purposes than flint, or some other varieties. We know it to be historically true, that a great many nations have been discovered utterly destitute of any knowledge of metals.

When we reflect how much of our present enlightenment is due to the use of metals, we can readily see that their discovery marks a most important epoch in the history of man. There is, then, every reason to suppose that stone was a most important article for primitive man. It was the material with which he fought his battle for existence, and we need not be surprised that its use extended through an enormously long period of time. Not only was primitive man thus low down in the scale, but of necessity his

progress must have been very slow.

The time during which men were utterly destitute of a knowledge of metals, far exceeds the interval that has elapsed since that important discovery. Scholars divide the stone age into two parts. In the first, the stone implements, are very few, of simple shapes, and in the main formed of but one variety of stone--generally flint~-and they were never polished. In the second division, we meet with a great many different implements, each adapted to a different purpose. Different varieties of stone were employed, and they also made use of bone, shell, and wood, which were often beautifully polished.

From what we have learned of the development of primitive society, it will not surprise us to learn that the first division of the age of stone comprises a vastly greater portion of time, and is far more ancient, than the second. We will give an outline showing the order of use of different materials; but it is here necessary to remark that Bronze was the first metal that man learned to use, and Iron the second.

ORDER IN WHICH DIFFERENT MATERIALS WERE USED FOR WEAPONS AND IMPLEMENTS BY PRIMITIVE MAN.

Age of Stone.

Rough, or Old Stone Age--Paleolithic.

Polished or New Stone Age--Neolithic.

Age of Metals.

Bronze Age.

Iron Age.

In this outline the words Paleolithic and Neolithic are the scientific terms for the two divisions of the Stone Age, and will he so used in these pages.

The only races of men that we could expect to find in Europe during the Glacial Age would be Paleolithic tribes, and it is equally manifest that we must find traces of them in beds of this age, or in association with animals that are characteristic of this age, or else we can not assert the existence of man at this time. The valley of the river Somme, in Northern France, has become classical ground to the student of Archaeology, since it was there that such investigations as we have just mentioned were first and most abundantly made. It is now well known that the surface features of a country--that is, its hills and dales, its uplands and lowlands--are mainly due to the erosive power of running water. Our rivers have dug for themselves broad valleys,

undermined and carried away hills, and in general carved the surface of a country, until the present appearance is the result. It must be confessed that when we perceive the slow apparent change from year to year, and from that attempt to estimate the time required to produce the effects we see before us, we are apt to shrink from the lapse of time demanded for its accomplishment. Let us not forget that "Time is long," and that causes, however trifling, work stupendous results in the course of ages.

Picture of Paleolithic Flints.--------

But a river which is thus digging down its channel in one place, deposits the materials so dug away at other and lower levels, as beds of sand and gravel. In the course of time, as the river gradually lowers its channel, it will leave behind, at varying heights along its banks, scattered patches of such beds. Wherever we find them, no matter how far removed, or how high above the present river, we are sure that at some time the river flowed at that height; and standing there, we may try and imagine how different the country must have looked before the

present deep valley was eroded.

In the case of the river Somme, we have a wide and deep valley, a large part of which has been excavated in chalk rock, through which the river now winds its way in a sinuous course to the English Channel. Yet we feel sure that at some time in the past it was a mighty stream, and that its waters surged along over a bed at least two hundred feet higher than now. In proof of this fact we still find, at different places along the chalky bluff, stretches of old gravel banks, laid down there by the river, "reaching sometimes as high as two hundred feet above the present water level, although their usual elevation does not exceed forty feet."

The history of the investigation of the ancient gravel beds of the Somme is briefly this: More than one instance had been noted of the finding of flint implements, apparently the work of men, in association with bones of various animals, such as hyenas, mammoths, musk-sheep, and others, which, as we have just seen, lived in Europe during the Glacial Age. In a number of cases such finds had been made in caves. But for a long time no one attributed any especial value to these discoveries, and various were the explanations given to account for such commingling.

A French geologist, by the name of Boucher DePerthes, had noted the occurrence of similar flint implements, and bones of these extinct animals, in a gravel pit on the banks of the Somme, near Abbeville, France. He was convinced that they proved the existence of man at the time these ancient animals lived in Europe. But no one paid any attention to his opinions on this subject, and a collection of these implements, which he took to Paris in 1839, was scarcely noticed by the scientific world. They were certainly very rude, and presented but indistinct traces of chipping, and perhaps it is not strange that he failed to convince any one of their importance. He therefore determined to make a thorough and systematic exploration of these beds at Abbeville. In 1847 he published his great work on this subject, giving over sixteen hundred cuts of the various articles he had found, claiming that they were proof positive of the presence of man when the gravels were depositing.

Picture of Flint Implements, so-called.------

Now there are several questions to be answered before the conclusions of the French geologist can be accepted. In the

first place, are these so-called flint implements of human workmanship? From our illustrations, we see that they are of an oval shape, tending to a cutting edge all around, and generally more or less pointed at one end. The testimony of all competent persons who have examined them is, that however rude they may be, they were undoubtedly fashioned by man. Dr. C. C. Abbott has made some remarks on implements found in another locality, equally applicable to the ones in question. He says: "We find, on comparing a specimen of these chipped stones with an accidentally fractured pebble, that the chipped surfaces of the former all tend toward the production of a cutting edge, and there is no portion of the stone detached which does not add to the availability of the supposed implement as such; while in the case of a pebble that has been accidentally broken, there is necessarily all absence of design in the fracturing."

Like the watch found on the moor, they show such manifest evidence of design, that we can not doubt that they were produced by the hand of man. But it is not enough to know that they are artificial, we must also know that they are of the same age as the beds in which they are found.

Section of Gravel Pit.----------

This cut represents a section of a gravel pit at St. Acheul, on the Somme. The implements are nearly always found in the lowest strata, which is a bed of gravel from ten to fourteen feet thick. Overlying this are beds of marl, loam, and surface soil, comprising in all a depth of fourteen feet. It has been suggested that the implements are comparatively recent, and have sunk down from above by their own weight, or perhaps have been buried in artificial excavations. The beds are however too compact to admit of any supposition that they may have been sunk there; and if buried in any excavation, evident traces of such excavation would have remained. We can account for their presence there in no other way than, that when the river rolled along at that high elevation, and deposited great beds of sand, these implements were someway lost in its waters, and became buried in the gravel deposits.

Finally, we have to consider the age of the deposits. This is a question that can be answered only by geologists, and we may be sure that more than ordinary attention has been bestowed upon them. The remains of many animals characteristic of the Glacial

Age were found in the beds at Abbeville. These include those of the elephants, rhinoceros, hyenas, cave-bear, and cave-lion.

In the formation of these gravel beds, ice has undoubtedly played quite an important part. Bowlders that could have got there only by the aid of ice, are found in several localities. Evidence gathered from a great many different sources all establish the fact that these gravels date as far back as the close of the Glacial Age at least, and there are some reasons for supposing them to be interglacial.

We can easily see that the melting away of the immense glaciers that we have been describing would produce vast floods in the rivers, and it is perhaps owing to the presence of such swollen rivers that are due the great beds of surface soil, called loam or loess, found in all the river valleys of France and Germany. These deposits frequently overlie the gravel beds. They are then of a later date than the beds in which are found such convincing proofs of the presence of man, and if they themselves date from the close of the Glacial Age, it is no longer a question whether the gravel beds themselves belong to that age. Thus we see that we can no longer escape the conclusions of Boucher DePerthes. The discovery of rudely worked

flints in the drift of the Somme River thus establishes the fact that some time during the Glacial Age, man in a Paleolithic state lived in France.

Geological terms convey to us no definite ideas as to the lapse of time, and we have an instinctive desire to substitute for them some term of years. In most cases this is impossible, as we have no means to measure the flight of past time, nor are we yet prepared to discuss the question of time, since to do so we must learn a great deal more about the cause of the Glacial Age. We might, however, cite statements which can not fail to impress us with the fact that a great extent of time has passed.

In the case of the river Somme we have a valley in some places a mile or more in width, and about two hundred feet in depth. This has mostly been excavated in chalk rock. Taking our present large rivers as a basis, it would require from one to two hundred thousand years for the Somme to perform this work. It will not do, however, to take the present action of our rivers as a guide, since we have every reason to suppose this work went forward much more rapidly in past times. But we can not escape the conclusion that it demands a very long time indeed to explain it. The valley has remained in its present

shape long enough to admit the formation of great beds of peat in some portions. Peat is formed by the decomposition of vegetable growth. Its growth is in all cases slow, depending entirely upon local circumstances. European scholars who have made peat formation a special study assure us that to form such immense beds as occur near Abbeville, several thousand years are required, even under the most favorable conditions.

Yet we would be scarcely willing to rest such important conclusions as the foregoing on the researches of one individual, or in one locality. As already stated, DePerthes made his discoveries public in 1847. Yet they were so opposed to all that had been believed previously, that but few took the pains to investigate for themselves. In 1853, Dr. Rigollot, of Amiens, who had been skeptical as to DePerthes, commenced to look for himself in the gravel beds at St. Acheul, about nine miles below Abbeville. As might be expected, he was soon convinced.

Picture of Paleolithic Flint, England.------

It may be said that the scientific world formally accepted the new theory when such English scientists as Evans, Falconer, Lyell, and Prestwich reported in its favor. Since that time, many discoveries of ancient implements have been made at various places in France and England under circumstances similar to those in the valley of the Somme. In England they have been found along almost all the rivers in the southern and south-eastern part. One class of discoveries there gives us new ideas as to the extent of time that has passed since they were deposited. That is where they occur in gravel beds having no connection with the present system of rivers. In one case the gravel forms a hill fifteen feet high, situated in the midst of a swampy district, surrounded on all sides by low, flat surfaces. Several such instances could be given; but, in all such cases, we can not doubt that, somewhere near, there once rolled the waters of an ancient river, that man once hunted along its banks, and that, owing to some natural cause, the waters forsook their ancient bed--and that since then, in the slow course of ages, the action of running water has removed so much of the surface of the land near there, that we can not guess at its ancient configuration: we only know, from scattered patches of gravel, that we are standing on the banks of an ancient water-course.

One instance, illustrative of the great change that has come over the surface features of the country, demanding for their accomplishment a great lapse of time, is furnished by the Isle of Wight. That island is now separated from the mainland by a narrow channel, called the South Hampton Water, or the Solent Sea.

It is now known that this is nothing but an old river channel, in which the sea has usurped the place of the river. The coast is a river embankment, with the usual accompaniments of gravel beds, flint implements, and fresh water shells. On the shores of the island we find the opposite bank of the old river. A very great change must have taken place in the surface features before the sea could have rolled in and cut off the Isle of Wight from the mainland.

In speaking of the length of time demanded for this change, Dr. Evans says: "Who can fully understand how immeasurably remote was the epoch when what is now that vast bay was high and dry land, and a long range of chalk downs, six hundred feet above the sea, bounded the horizon on the South? And yet that must have been the sight that met the eye of primitive man who

frequented the banks of that ancient river, which buried their handiwork in gravels that now cap the cliffs--and of the course of which so strange and indubitable a memorial subsists in what has now become the Solent Sea?"

The illustrations scattered through this essay are representations of the stone implements found in the drift of European rivers. During all the long course of time supposed to he covered by the Paleolithic Age, there are but very few evidences of any improvement, as far as we can judge from the implements themselves. This is in itself a melancholy proof of the low condition of man. He had made so little advance in the scale of wisdom, he possessed so little knowledge, he was so much a creature of instinct, that, during the thousands of years demanded for this age, he made no appreciable progress. The advance of the last century was many times greater than that of the entire Paleolithic Age. A blow struck on one end of a piece of flint will, owing to the peculiar cleavage of flint, split off pieces called flakes. This is the simplest form of implement used by man. It is impossible to say with certainty how they were used; but, from the evidence observed on them, they were probably used as scrapers. The men of that day doubtless knew some simple method of preparing clothing from the

skins of the animals they had killed, and probably many of these sharp-rimmed flakes were used to assist in this primitive process of tanning.

Illustration of Flint Flakes.--------

When the piece of flint itself was chipped into form, it was one whose shape would indicate a spear-head or hatchet. We present illustrations of each. Forms intermediate between these two are found. Some have such a thick heavy base that it is believed they were used in the hand, and had no handle or haft.

Others, with a cutting edge all round, may have been provided with a handle. M. Mortillet, of France, who has had excellent opportunities of studying this question very thoroughly, thinks that the hatchet was the only type of implement they possessed, and that it was used for every conceivable purpose--but that their weapon was a club, all traces of which have, of course, long since vanished away.

Illustrations of Spear Head Type and Hatchet Type.------

These few implements imply that their possessors were savages like the native Australians. In this stage of culture, man lived by hunting, and had not yet learned to till the ground, or to seek the materials out of which his implements were made by mining. Re merely fashioned the stones which happened to be within reach in the shallows of rivers as they were wanted, throwing them away after they had been used. In this manner the large numbers which have been met with in certain spots may be accounted for. Man at this time appears before us as a nomad hunter, poorly equipped for the struggle of life, without knowledge of metals, and ignorant of the art of grinding his stone tools to a sharp edge. Of course we can not hope to learn much of their social condition other than that just set forth.

DePerthes found some flints which show evidence of their human origin, and yet it would be very difficult to say what was their use. He thinks they may have a religious significance, and has set forth a great variety of eloquent surmises respecting them. It only need be said that such theorizing is worse than useless. That while it is very probable these tribes had some system of belief, yet there is no good reason for supposing these

flints had any connection with it. It has been supposed, from another series of wrought flints, that the men of this epoch were possessed of some sentiments of art, as pieces have been found thought to represent the forms of animals, men's faces, birds, and fishes; but as very few have been able to detect such resemblances, it is safe to say they do not exist.

As the love of adornment is almost as old as human nature itself, we may not be surprised to find traces of its sway then. Dr. Rigollot found little bunches of shells with holes through either end. The supposition is that these were used as beads; which is not at all strange, considering how instinctively savage men delight in such ornaments. These ancient hunters made use of beads partially prepared by nature.

Europe is not the only country where the remains of this savage race are found. They are found in the countries bordering the Mediterranean in Northern Africa, and in Egypt. In this latter country they are doubtless largely buried under the immense deposits of Nile mud; yet in 1878 Professor Haynes discovered in Upper Egypt scrapers and hatchets, pronounced by archaeologists to be exactly similar to those of the river Somme. We are not informed as to their geological age, but there can be no

question that they are much older than any monument of Egyptian civilization hitherto known.

Paleolithic implements have also been found in Palestine and in India. In the latter country the beds are so situated that they present the same *indicia,* of age as do those of the Somme Valley. A great portion of the formation has been removed, and deep valleys cut in them by running water. They have also been found in at least one locality in the United States; that is in the glacial gravel of the valley of the Delaware at Trenton, New Jersey. We must not confound these remains with those of the Indian tribes found scattered over a large extent of surface. Those at Trenton also are not only in all respects, except materials, similar to those of the Somme, but are found imbedded in a formation of gravel that was deposited at least as far back as the close of the Glacial Age, thus requiring the passage of the same long series of years since they were used, as do the implements of European rivers. We must also bear in mind that no country has been so carefully explored for these implements as has Europe, and that the very country, Asia, where, for many reasons, we might hope to find not only unequivocal proofs of man's presence but from our discoveries be able to clear up many dark points, as to the race, origin, and

fate of these primitive tribes, is yet almost a sealed book.

But the scattered discoveries we have instanced show us that the people whose implements have been described in this chapter were very widely dispersed over the earth, and everything indicates that they were far removed from us in time. The similarity in type of implements shows that, wherever found, they were the same people, in the same low savage state of culture--"Alike in the somber forests of oak and pine in Great Britain, and when surrounded by the luxuriant vegetation of the Indian jungle."

We have yet two important points to consider. The first is, what race of men were these river tribes? and second, when did they arrive in Europe? Did they precede the glacial cold? did they make their appearance during a warm interglacial period? or was it not until the final retreat of the glaciers that they first wandered into Europe? These questions are far from settled; yet they have been the object of a great amount of painstaking research.

To determine the first point, it is necessary that anatomists have skeletons of the men of this age, to make a careful study of them. But for a great many reasons, portions of the human

skeleton are very rarely found in such circumstances that we are sure they date back to the Paleolithic Age, and especially is this true of the men of the River Drift. In a few instances fragmentary portions have been found.

M. Quatrefages, of France, who is certainly a very high authority on these points, thinks that the hunter tribes of the River Drift belonged to the Canstadt race--"so named from the village of Canstadt, in Germany, near which a fossil skull was discovered in 1700, and which appears to be closely allied to the Neanderthal skull, discovered near Dusseldorf in 1857, and about which so much has been written." Quatrefages supposes that this type of man is still to be found in certain Australian tribes. These are not mere guesses, but are conclusions drawn from careful study by eminent European scholars.

It is well known that a competent naturalist needs but a single fossil bone to describe the animal itself, and tell us its habits. So also anthropologists need but fragments of the human skeleton, especially of the skull, to describe characteristics of the race to which the individual belonged.

Illustration of Neanderthal Man.----------

This cut, though an ideal restoration, is a restoration made in accordance with the results of careful study of fragmentary skulls found in various localities in Europe. The head and the face present a savage aspect; the body harmonized with the head; the height was not more than five feet and a half; yet the bones are very thick in proportion to their length, and were evidently supplied with a powerful set of muscles, since the little protuberances and depressions where the muscles are attached are remarkably well developed. Huxley and Quatrefages have both pointed out that representatives of this race are to be found among some Australian tribes. "Among the races of this great island there is one, distributed particularly in the province of Victoria, in the neighborhood of Port Western, which reproduces in a remarkable manner, the characters of the Canstadt race." Not the least interesting result of this discovery is the similarity of weapons and implements. "With Mr. Lartet, we see in the obsidian lances of New Caledonia the flint heads of the lower alluvium of the Somme. The hatchet of certain Australians reminds us, as it did Sir Charles Lyell, of the Abbeville hatchet.

Yet some hesitate about accepting these interesting inferences, thinking that the portions of the human skeleton thus far recovered, which are beyond a doubt referable to this period, are too fragmentary to base such important conclusions upon. This is the view of Boyd Dawkins, who thinks "we can not refer them to any branch of the human race now alive." "We are without a clew," continues he, "to the ethnology of the River Drift man, who most probably is as completely extinct as the woolly rhinoceros or the cave bear." Future discoveries will probably settle this point.

It is yet a much disputed point to what particular portion of the Glacial Age we can trace the appearance of man. We can profitably note the tendency of scientific thought in this direction. But a short time has elapsed since a few scholars here and there began to urge an antiquity for man extending back beyond the commonly accepted period of six thousand years. Though it is now well known and admitted that there are no good grounds for this estimate, yet such was its hold, such its sway over scientific as well as popular thought, that an appeal to this chronology was deemed sufficient answer to the discoveries of DePerthes, Schmerling, and others. It was but yesterday that this popular belief was overthrown and due weight given the

discoveries of careful explorers in many branches, and the antiquity of man referred, on indisputable grounds, to a point of time at least as far back as the close of the preceding geological age.

It seems as if here a halt had been called, and all possible objections are urged against a further extension of time. It is, of course, well to be careful in this matter, and to accept only such results as inevitably follow from well authenticated discoveries. But it also seems to us there is no longer any doubt that man dates back to the beginning of that long extended time we have named the Glacial Age.

In the first place, we must recall the animals that suddenly made their appearance in Europe at the beginning of this age. Though there were a number of species, since become extinct, the majority of animal forms were those still living.

These are the animals with which man has always been associated. There is therefore no longer any reason to suppose the evolution of animal life had not reached that stage where man was to appear. We need only recall how strongly this point was urged in reference to the preceding geological epoch, to see its

important bearings here. Mr. Boyd Dawkins has shown that the great majority of animals which invaded Europe at the commencement of this age, can be traced to Northern and Central Asia, whence, owing to climatic changes, they migrated into Europe.

Inasmuch as man seems to have been intimately associated with these animals, it seems to us very likely that he came with them from their home in Asia. We think the tendency of modern discoveries is to establish the fact that man arrived in Europe along with the great invasion of species now living.

Turning now to the authorities, we find this to be the accepted theory of many of those competent to form an opinion.

In England Mr. Geikie has strongly urged the theory that the Glacial Age includes not only periods of great cold, but also epochs of exceptional mildness; and he strongly argues that all the evidence of the River Drift tribes can be referred to these warm interglacial epochs; in other words, that they were living in Europe during the Glacial Age.

In answer to this it has been stated that the relics of River

Drift tribes in Southern England overlie bowlder clay, and must therefore be later in origin than the Glacial Age.

But, Mr. Geikie and others have shown that the ice of the last great cold did not overflow Southern England, so that this evidence, rightly read, was really an argument in favor of their interglacial age. The committee appointed by the British Association to explore the Victoria Cave, near Settle, urge this point very strongly in their final report of 1878. To this report Mr. Dawkins, a member of the committee, records his dissent, but in his last great work he freely admits that man was living in England during the Glacial Age, if he did not, in fact, precede it.

Mr. Skertchley, of the British coast survey, in 1879, announced the discovery in East Anglia of Paleolithic, implements underlying the bowlder clay of that section. Mr. Geikie justly regards this as a most important discovery.

Finally Mr. Dawkins, in his address as President of the Anthropological section of the British Association, in 1882, goes over the entire ground. After alluding to the discovery of paleolithic implements in Egypt, India, and America, he

continues: "The identity of implements of the River Drift hunter proves that he was in the same rude state of civilization, if it can be called civilization, in the Old and the New World, when the hand of the geological clock struck the same hour. It is not a little strange that this mode of life should have been the same in the forests of the North, and south of the Mediterranean, in Palestine, in the tropical forests of India, and on the western shores of the Atlantic." This, however, is not taken as proving the identity of race, but as proving that in this morning-time of man's existence he had nowhere advanced beyond a low state of savagism. Mr. Dawkins then continues: "It must be inferred from his wide-spread range that he must have inhabited the earth for a long time, and that his dispersal took place before the Glacial epoch in Europe and America. I therefore feel inclined to view the River Drift hunter as having invaded Europe in preglacial times, along with other living species which then appeared." He also points out that the evidence is that he lived in Europe during all the changes of that prolonged period known as the Glacial Age.

Sir John Lubbock also records his assent to these views. He says on this point: "It is, I think, more than probable that the. advent of the Glacial Period found man already in possession

of Europe."

In our own country Prof. Powell says: "It is now an established fact that man was widely scattered over the earth at least as early as the beginning of the Quaternary period, and perhaps in Pliocene times."

This completes our investigation of the men of the River Drift. We see how, by researches of careful scholars, our knowledge of the past has been enlarged. Though there are many points which are as yet hidden in darkness, we are enabled to form quite a clear mental picture of this early race. Out of the darkness which still enshrouds the continent of Asia we see these bands of savages wandering forth; some to Europe, Africa, and the west; others to America and the east.

This was at a time when slowly falling temperature but dimly prophesied a reign of arctic cold, still far in the future.
This race does not seem to have had much capacity for advancement, since ages came and went leaving him in the same low state. During the climax of glacial cold he doubtless sought the southern coasts of Europe along with the temperate species of animals. But whenever the climatic conditions were such that

these animals could find subsistence as far north as England he accompanied them there, and so his remains are found constantly associated with theirs throughout Europe. Though doubtless very low in the scale, and at the very foot of the ladder of human progress, we are acquainted with no facts connecting them with the higher orders of animals. If such exists, we must search for them further back in geological time. The men of the River Drift were distinctively human beings, and as such possessed those qualities which, developing throughout the countless ages that have elapsed, have advanced man to his present high position.

REFERENCES

(1) This chapter was submitted to Prof. G. F. Wright, of Oberlin, for criticism.

(2) Lyell's "Antiquity of Man;" Geikie's "Prehistoric Europe," p. 332.

(3) It is, however, applicable to only a portion of the Quaternary, or Post-tertiary period. (Wright.)

(4) Chapter II.

(5) Geikie's "Prehistoric Europe," p. 339.

(6) Dawkins's "Cave Hunting," p. 365.

(7) Dawkins's "Early Man in Britain," p. 112.

(8) Geikie's "Prehistoric Europe," p. 337.

(9) The majority of the Pliocene animals disappeared from Europe at the close of the period in question. This includes such animals as the mastodon, hipparion, and many kinds of deer (Geikie's "Prehistoric Europe," p. 334). The following animals survived into the Glacial Age, and some even into Inter-glacial periods: African hippopotamus (still living), saber-toothed lion, bear of Auvergne, big-nosed rhinoceros, Etruskan rhinoceros, Sedgwick's deer, deer of Polignac, Southern elephant. ("Prehistoric Europe," p. 95.)

(10) The northern animals include the following: Alpine hare, musk-sheep, glutton, reindeer, arctic fox, lemming, tailless hare, marmot, spermophile, ibex, snowy vole, chamois. (Geikie's "Prehistoric Europe," p. 32.)

(11) Geikie's "Prehistoric Europe," p. 28.

(12) The following animals are given as southern species: Hippopotamus, African elephant, spotted hyena, striped hyena, serval, caffer cat, lion, leopard. In addition to the above there were also four or five species of elephants and three species of rhinoceros, which have since become extinct. (Geikie's "Prehistoric Europe," p. 32.)

(13) It is scarcely necessary to give a list of these animals. Prof. Dawkins enumerates thirty-three species. The following are

some of the most important: Urus, bison, horse, stag, roe, beaver, rabbit, otter, weasel, martin, wildcat, fox, wolf, wild boar, brown bear, grizzly bear. (Geikie's "Prehistoric Europe," p, 32.)

(14) Dawkins's "Early Man in Britain," p. 191.

(15) Lubbock's "Prehistoric Times," p. 316.

(16) Geikie's "Prehistoric Europe," p. 87.

(17) Geikie's "Prehistoric Europe," p. 50.

(18) Geikie's "Prehistoric Europe," p. 54.

(19) Ibid., p. 55.

(20) Kane's "Arctic Exploration," Vol. I, p. 225.

(21) Geikie's "Prehistoric Europe," p. 180.

(22) Wallace's "Island Life," p. 104.

(23) Geikie's "Prehistoric Europe," p. 189.

(24) Ibid., p. 192, *et seq.*

(25) Dawkins's "Early Man in Britain."

(26) For fuller information on this topic see James Geikie's "The Great Ice Age;" also, by the same author, "Prehistoric Europe." In Appendix "B" of this latter work the author gives a map of Europe at the climax of the Glacial Age, showing the great extension of the glaciers. This map embodies the results of the labors of a great many eminent scholars. See also Croll's "Climate and Time;" also Wallace's "Island Life," pp. 102-202.

We are not aware that the statements as set forth above are seriously questioned by any geologist of note. Some consider it quite possible that the bowlder clays of Southern England and Central Germany were deposited during a period of submergence from melting icebergs. (Dawkins's "Early Man in Britain," p. 116.) But even this demands vast glaciers to the north of this supposed submergence to produce the icebergs. The weight of authority, however, is in favor of the glaciers. (Geikie's "Prehistoric Europe," p. 175.)

(27) Haywood's Heer's "Primeval World of Switzerland," p. 200.

(28) "Prehistoric Europe," p. 261. It is no longer a question that there was at least one mild period separating two periods of cold in Europe. See Lubbock's "Prehistoric Times," p. 316; Dawkins's "Early Man in Britain," pp. 115-120; Lyell's "Antiquity of Man," pp. 282-285., Dana's "Manual of Geology," first edition, p. 561; Haywood's Heer's "Primeval World of Switzerland," Vol. II, p. 203; Wallace's "Island Life," p. 114; Croll's "Climate and Time." Mr. Geikie, in his works, "The Great Ice Age" and "Prehistoric Europe," maintains there were several warm interglacial epochs.

(29) Wright.

(30) Morgan's "Ancient Society," p. 29.

(31) Geikie's "Prehistoric Europe," p. 365. Morgan's "Ancient

Society," p. 39.

(32) Rau's "Early Man in Europe," p. 14.

(33) "Primitive Industry," p. 485.

(34) Lubbock's "Prehistoric Times," 384.

(35) Geikie's "Prehistoric Europe," chap. ix. Most geologists suppose there was a general depression of the region below the sea level, or so as to form inland lakes, and that the loess was thus deposited, as perhaps it is depositing at the present time in the lakes of Switzerland. (Wright.)

(36) Lubbock's "Prehistoric Times," p. 423.

(37) Evans's "Ancient Stone Implements," p. 621.

(38) *Pop. Science Monthly,* Oct., 1883.

(39) Dawkins's "Ear. Man in Brit.," p. 163.

(40) Wright's 'Studies in Science and Religion," p. 278. See also British Association Report, 1882, p. 602.

(41) Lubbock's "Prehistoric Times," p. 356.

(42) Abbott's "Primitive Industry."

(43) Dawkins's "Early Man in Britain," p. 172.

(44) Wright.

(45) Quatrefages's "Human Species," p. 307.

(46) "Human Species," p. 305.

(47) Ibid., p. 307.

(48) Quatrefage's "Human Species," p. 306.

(49) "Early Man in Britain," p. 173.

(50) Ibid., p. 233.

(51) We do not give any estimate in years as to this antiquity in this chapter.

(52) We must remember that this age is also variously called the Quaternary, Pleistocene, and Post Tertiary. We do not now refer to the evidence of man's existence in the Miocene and Pliocene, treated of in the preceding chapter.

(53) Mr. Dawkins finds that fifty-five out of seventy-seven species are yet living. "Early Man in Britain," p, 109.

(54) "Early Man in Britain," p. 110.

(55) Those who reject the proofs of the existence of man in Pliocene times because the evolution of life had not then reached a stage where we could hope to find man, are here confronted with a difficulty. If Mr. Dawkins be right (as stated above) then the various animals in question must have been living in Asia during the preceding Pliocene Age. There is no reason to suppose man was not associated with them, since he belongs to the same stage of evolution (Le Conte's "Elements of Geology," p. 568), and though, owing to climatic and geographical causes, the animals themselves might have been confined to Asia, there is surely no good reason why man may not, in small bands, and at various times, have wandered

into Europe.

(56) "Prehistoric Europe," "The Great Ice Age."

(57) Dawkins's "Early Man in Britain," p. 170.

(58) "Prehistoric Europe," p. 268.

(59) Ibid., 360.

(60) British Assoc. Rep., 1878.

(61) "Early Man in Britain," pp. 137, 141, and 169, with note.

(62) British Assoc. Rep., 1879.

(63) Prehistoric Europe, p. 263.

(64) British Assoc. Rep., 1882.

(65) Preface to Kains-Jackson's "Our Ancient Monuments."

(66) "First Annual Report, Bureau of Ethnology," p. 73.

END OF CHAPTER III**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Chapter IV

CAVE-MEN.

Other sources of Information--History of Cave Exploration--The formation of Caves--Exploration in Kent's Cavern--Evidence of two different races--The higher culture of the later race--Evidence of prolonged time--Exploration of Robin Hood Cave--Explorations in Valley of the River Meuse--M. Dupont's conclusions--Explorations in the Valley of the Dordogne--The Station at Schussenreid--Cavemen not found south of the Alps--Habitations of the Cave-men--Cave-men were Hunters--Methods of Cooking--Destitute of the Potter's art--Their Weapons--Clothing --Their skill in Drawing--Evidence of a Government--Of Religious belief--Race of the Cave-men--Distinct from the men of the Drift--Probable Connection with the Eskimos.

We have been delving, among the sands of ancient river bottoms for a proof of man's existence in far remote times. Slight and unsatisfactory as they may be to some, they are the materials with which we reconstruct a wondrous story of life and times removed from us by many a cycle of years.

Men have frequently resorted to the caverns of the earth for protection. In places we find caves that served this purpose during the Paleolithic Age. The men of the Drift, however, do not appear to have used them, save as temporary places of refuge, perhaps as a protection from bands of savage enemies, or from unusually inclement weather. But yet most surprising results have attended the exploration of caves in England, France, and Belgium. We find in those gloomy places that the men of the Drift were not the only tribes of men inhabiting Europe during the Glacial Age. In fact, living at later date than the Drift tribes, but still belonging to the Paleolithic Age, were tribes of people who appear to have utilized caverns and grottoes as places of permanent resort, and, judging from their remains, they had made considerable advance in the arts of living as compared with the tribes of the Drift.

But before pointing out the grounds upon which these conclusions rest, it may be well to give a slight review of the history of cave research. The dread and awe which kept people away from caves during the Middle Ages preserved their contents for later discoverers. In the seventeenth century, some adventurous spirits began to search in them for what they called Unicorn horns, which were deemed a most efficacious remedy for various diseases. This search served the good purpose of bringing to light various fossil bones of animals, and calling the attention of scientific men to the same.

The cave of Gailenreuth, in Bavaria, was explored by Dr. Goldfuss in 1810. He came to the conclusion that the bones of bears and other extinct animals were proofs of the former presence of the animals themselves. Dr. Buckland, a celebrated English writer, visited the cave in 1816, and became much interested in the work; so much so that when Kirkdale Cavern, in England, was discovered in 1821, he at once repaired to the spot and made a careful exploration. The results satisfied him that hyenas and other extinct animals had once lived in England. He followed up his explorations in a number of cases, and published a work on this subject in 1822, which marks the commencement of a new era in cave research.

In 1825 Kent's Cavern, near Torquay, was discovered, and Rev. J. McEnry made partial explorations in it. He discovered flint implements and perceived they might be a proof of the presence of man with these extinct animals. Dr. Buckland had not found these relics, or else had passed them by as of no importance, for he refused to entertain the theory that man and the extinct animals had been contemporaneous. Explorations made in France in 1827-8 had furnished such strong evidence on this point that it was deemed established by some scholars, but being opposed to the prevailing belief, nothing came of it.

Illustration of Gailenreuth.---------

In 1829 Schmerling commenced his investigations in the caves of the valley of the Meuse. For years he continued his work under many difficulties. Sir Charles Lyell tells us he was let down day after day to the opening of the Engis Cave by a rope tied to a tree. Arriving there he crawled on all fours through a narrow passage way to the enlarged chamber, where, standing in mud and water, he superintended the investigations. He examined over

forty of those caves, and published his results in 1833. He clearly showed that man must have been living along with various animals now extinct in Belgium. But, as before remarked, it was deemed sufficient answer to this careful explorer to point out that his results were opposed to the accepted chronology, and so they were passed by. When the time at last came, and their true worth was recognized, Schmerling himself had passed away.

We have already seen what great results followed the exploration of DePerthes in the river gravels. When it had been clearly established that man and extinct animals hid coexisted in Europe, the results of cave explorations were eagerly recalled, and governments vied with royal societies and private individuals in continuing the researches. The results are that a rich store of facts has been gathered from those gloomy resorts, illustrative of the later stages of Paleolithic art.

A word as to the formation of caves, grottoes, caverns, and rock shelters. These vary greatly in size, some being so small as to furnish protection to but few individuals; others, especially caves, so large that whole tribes might have found a place of resort within their chambers. They are found in all limestone

countries. The formation of caves is now recognized as due to natural causes acting slowly through many years. Limestone rock is very hard and durable, but chemistry teaches us that water charged with carbonic acid gas will readily dissolve it. Rain-water falling from the clouds is sure to come in contact with masses of decaying vegetable matter, which we know is constantly giving off quantities of this gas. Laden with this the water sinks into the ground, and, if it comes in contact with limestone, readily washes some of it away in solution. But beds of limestone rock are noted for containing great fissures through which subterranean waters penetrate far into the ground. We can readily see how this percolating water would dissolve and wear away the surface of the rocks along such a fissure, and in process of time we would have the phenomenon of a stream of water flowing under ground.

Owing to a great many causes--such, for instance, as the meeting of another fissure--we would expect that portions of this underground way would become enlarged to spacious halls. In some such a way as this it is now understood that all caves have originated.

Owing to many natural causes the river may, after a while, cease

to flow, leaving enlarged portions of its channel behind as a succession of chambers in a cave. But water would still come trickling in from the tops and sides, and be continuously dripping to the floor, where it speedily evaporates. When such is the case it leaves behind it the limestone it held in solution. So, in process of time, if the deposition is undisturbed, there will be formed over the floor of the cave a more or less continuous layer of limestone matter known as stalagmite. The same formations on the top and sides of the cave are called stalactites. In places where the drip is continuous the stalactite gradually assumes the shape of an immense icicle; while the stalagmite on the floor of the cave, underneath the drip, rises in a columnar mass to meet the descending stalactite. A union of these is not uncommon, and, we have pillars and columns presenting the strange, fantastic appearance on which tourists delight to dwell in their notes of travel.

While these accumulations are in all cases very slow, still we can not measure the time since it commenced by the rate of present growth, because this rate varies greatly at different times and places even in the same cave. And we must also remark that this complete series of changes only occur in a few localities, the majority of caves being insignificant

in size.

From what has been said as to the formation of caves, we would expect them to occur in river valleys, and this is the case, though in some instances there have been such immense changes in the surface level of the country that we can now find no trace of rivers near them. This is exactly similar to some gravel deposits, which, as we have seen, are occasionally found where is now no running water. The most noted caverns, however, are found high up on the banks of existing rivers. We can not doubt that the rivers were the cause of the caves. But having excavated their beds below the level of the then existing caves, they ceased to flow in them, and left them to be occupied by savage animals and the scarcely less savage men. But at times, swollen by floods, the river would again assert its supremacy and roll its waters through its old channels.

These floods would not only tear up and rearrange whatever *debris* had already accumulated, but would introduce quantities of sediment and animal remains. In some such a manner as is here pointed out (though exactly how geologists are not agreed) caves were invaded, after being long occupied by men or animals, by floods of water. In many cases the evidence would

seem to indicate that after such a visitation by water the cave and its water-rolled and water-arranged contents were left to silence, visited by neither man nor beast. In such instances stalagmitic coverings would gradually form over the confused *debris,* and in some places acquire a thickness of several feet. In some instances several such floors are found one above the other, pointing to a prolonged period of usage, and then a quiet stage, in which the drip of falling water alone broke the silence, and nature sealed up another chapter of cave biography beneath the layer of stalagmite.

One of the most important caves of England is Kent's Cavern, before mentioned. This cave was carefully explored under the direction of a committee appointed by the British Association, and to show the care and thoroughness of the work we need only state that this work occupied the greater portion of sixteen years, and hence the results obtained may be regarded as, in a general way, illustrative of the life of the cave dwellers.

"This cave is about a mile east of Torquay harbor, and is of a sinuous character, running deeply into a hill of Devonian limestone, about half a mile distant from the sea. In places it expands into large chambers, to which various distinctive names have been given."

Let us see what general results have been reached by this committee. The investigation disclosed several different beds of stalagmite, cave earth, and breccia. The lowest layer is a breccia. The matrix is sand of a reddish color, containing many pieces of rock known as red-grit and some pieces of quartz. This implies the presence of running water, which at times washed in pieces of red-grit. The surface features must have been quite different from the present, since now this rock does not form any part of the hill into which this cave opens. And this change in drainage took place before this lowest layer was completed, since not only bears, but men, commenced to visit the cave. The presence of bears is shown by numerous bones, and that of man by his implements.

Illustration of Spear-head--Lower Breccia, Kent's Cavern.---

We must notice that all the implements found in the breccia are similar to those of the Drift, being rudely formed and massive. No doubt these are the remains of Drift men, who, for some cause or other, temporarily visited the cave, perhaps contending with

the cave bear for its possession. But a time at length arrived when for some reason neither animals nor man visited the cave. The slow accumulation of stalagmite went forward until in some places it had obtained a thickness of twelve feet. Freely admitting that we can not determine the length of time demanded for this deposition, yet none can doubt that it requires a very long time indeed. Says Mr. Geikie: "How many centuries rolled past while that old pavement was slowly accreting, no one can say; but that it represents a lapse of ages compared to which the time embraced by all tradition and written history is but as a few months, who that is competent to form an opinion can doubt?" But after this long period of quiet, from some source great torrents of water came rolling through the cave. We know this to be so, because in places it broke up this layer of stalagmite and washed it away, as well as large portions of the breccia below, and after the floods had ceased, occasionally inundations still threw down layers of mud and silt.

This accumulation is known as cave earth, and is the layer containing the numerous remains of the Cave-men. Here the explorers were not only struck with the large number of implements, but at once noticed that they were of a higher form and better made. Instead of the rude and massive implements of the Drift tribes, we have more delicate forms chipped all

around. And we also meet with those that from their form may have been used as the heads of spears or arrows. Flakes were also utilized for various purposes. We also find implements, weapons, and ornaments of bone--a step in advance of Drift culture. They had "harpoons for spearing fish, eyed needles or bodkins for stitching skins together, awls perhaps to facilitate the passage of the slender needle through the tough, thick hides; pins for fastening the skins they wore, and perforated badgers' teeth for necklaces or bracelets." Nothing of this kind has yet been shown as belonging to the men of the Drift.

Illustrations of Spear-head and Flake----------

The bones of a large number of animals are also found in the cave earth. The most abundant is the hyena, and no doubt they dragged in a great many others; but the agency of man is equally apparent, as the bones have often been split for the extraction of marrow. Besides bones of the hyena, we have also those of the lion, tiger, bear, and reindeer.

Illustration of Harpoons, Pin, Awl, and Needle--Kent's Cavern.

With these animals man, from time to time, disputed possession of the cave. At one place on the surface of the cave earth is found what is known as the "black band." This is nothing more or less than the fire-place of these old tribes. Here we find fragments of partially consumed wood, bones showing the action of fire--in short, every thing indicating a prolonged occupancy by man.

No one can doubt but that this deposit of cave earth itself requires a prolonged time for its accumulation. But this period, however prolonged, at length comes to an end. From some cause, both animals and man again abandoned the cave. Another vast cycle of years rolls away--a time expressed in thousands of years--during which nature again spread over the entombed remains a layer of stalagmite, in some places equal in thickness to the first formation. Above this layer we come to a bed of mold containing remains of the later Stone Age, of the Bronze, and even of the Iron Age. Below the first layer of stalagmite--the completed biography of Paleolithic times; above,

the unfinished book of the present. Such are the eloquent results obtained by the thorough exploration of one cave. The results of all the other explorations, in a general way, confirm these. Mr. Dawkins explored a group of caverns in Derbyshire, England. These caverns and fissures are situated in what is known as Cresswell Crags, the precipitous sides of a ravine through which flows a stream of water dividing the counties of Derby and Nottingham.

This cut represents the different strata in Robin Hood cave. It will be seen that, at one place, the stalactite has united with the stalagmite below. It is not necessary to go into the details of this exploration. All the relics of man found in *d, c,* and the lower portions of *b,* are the rude and massive forms peculiar to the River Drift tribes. But the relics found in the breccia *a,* and the upper portion of the cave earth *b,* denote a sudden advance in culture. The rude tools of the lower strata are replaced by more highly finished ones of flint.

Illustration of Robin Hood Cave.----------

The most important discovery was that of a small fragment of rib, with its polished surface ornamented with the incised figure of a horse. The peculiar value of this discovery is, that it serves to connect the Cave-men of England with those of the continent who, as we shall afterward see, excelled in artistic work of this kind.

In another cave of this series, in association with similar flints, were found the following bone implements. We can only conjecture the use of the notched bone. The pieces of reindeer horn, terminating in a scoop, may have served as a spoon to extract marrow.

Illustration of Horse Incised on Piece of Rib.------

We must not fail to notice that the more highly finished relics of the Cave-men are found in strata overlying those of the River Drift; and, in the case of Kent's Cavern, these two sets of implements are separated by a layer of stalagmite requiring a

very prolonged time for its formation. This would imply that the Cave-men came into England long after the tribes of the River Drift; and, judging from the relics themselves, they must have been a distinct people. We must recall how completely the climate and animals in England varied during the Glacial Age. We have also seen how closely connected the River Drift tribes were with the animals of the warm temperate regions. Coming at a later date, totally distinct from them in culture are those Cave-men--perhaps they may prove to be associated with the Arctic animals. But, before speculating on this point, we must learn the results attending the exploration of the caves of Belgium, France, and other countries on the continent of Europe.

Illustration of Bone Implements--Cresswell Crags.----------

In the valley of the river Meuse (Belgium), and its tributaries, have been found a number of caves and rock-shelters. It was in the caves of the Meuse that Schmerling made his explorations. When the real value of his work was recognized, the Belgian government had a thorough exploration made by M. Dupont, director of the Royal Museum in Brussels. This gentleman

scientifically examined forty-three of these resorts. His opinions, therefore, are deserving of great weight; but, unfortunately, they are not accepted by all. These caves vary greatly in size--many being mere rock-shelters. From their position, we are at once struck with the prolonged period of time necessary to explain their formation. They are found at very different heights along the river's bank. In one case two caves are so situated that the river must have sunk its bed nearly two hundred feet between the time of their formation.

M. Dupont thinks the evidence very clearly points to the presence of two distinct stages in cave life--one of which he calls the Mammoth period, and the other, which is more recent, the Reindeer. It is, however, known that the mammoth lived all through the Reindeer epoch, if not to later times; so the names bestowed on these periods do not seem very appropriate. We can readily see, however, that, while the names might be wrong, the two periods might be reality. In many cases, the same cave contained remains of both stages, separated by layers of cave earth, and it is noticed that, in such cases, those of the Reindeer stage are invariably of a later date. In general terms, M. Dupont finds that the implements of the Mammoth period are of a rude make, consisting of a poor kind of flint, and poorly

finished. But, in beds of the Reindeer epoch, the flint implements consist, principally, of well-shaped blades and flakes--with numerous bodkins, or awls--javelins, or arrow-heads --besides articles of bone and horn such as harpoons, and teeth of various animals drilled as if suspended for ornaments. Their workmanship indicates decidedly more skill than that of the implements obtained from the lower levels. But the most remarkable finds of the Reindeer epoch consist of portions of reindeer horn, showing etchings or engravings which have been traced by some sharp point, no doubt by a flint implement. One small bit of horn has been cut or scraped so as to present the rude outline of a human figure.

So far the evidence seems to bear out the same conclusions as do those of the British caves, though it also shows that the men of the Drift inhabited caves quite extensively. We must remember, however, that the greatest wealth of cave relics belongs to the so-called Cave-men, but that savage tribes have always resorted to caves as a place for occasional habitation.

It is in France that we find the greatest wealth of relics of Cave-men. Sir John Lubbock has left us a description of the valley of the Vezere, where these caverns occur. The Vezere is a

small tributary of the Dordogne. "The rivers of the Dordogne run in deep valleys cut through calcareous strata: and while the sides of the valley in chalk districts are generally sloping, in this case, owing probably to the hardness of the rock, they are frequently vertical. Small caves and grottoes frequently occur: besides which, as the different strata possess unequal power of resistance against atmospheric influence, the face of the rock is, as it were, scooped out in many places, and thus 'rock-shelters' are produced. In very ancient times these caves and rock-shelters were inhabited by men, who have left behind them abundant evidence of their presence.

"But as civilization advanced, man, no longer content with the natural but inconvenient abode thus offered to him, excavated chambers for himself, and in places the whole face of the rock is honey-combed with doors and windows, leading into suits of rooms, often in tiers one over the other, so as to suggest the idea of a French Petra. Down to a comparatively recent period, as, for instance, in the troublous times of the Middle Ages, many of these, no doubt, served as very efficient fortifications, and even now some of them are in use as store-houses, and for other purposes, as, for instance, at Brantome, where there is an old chapel cut in solid rock.

"Apart from the scientific interest, it was impossible not to enjoy the beauty of the scene which passed before our eyes, as we dropped down the Vezere. As the river visited sometimes one side of the valley, sometimes the other, so we had at one moment rich meadow lands on each side, or found ourselves close to the perpendicular and almost overhanging cliff. Here and there we came upon some picturesque old castle, and though the trees were not in full leaf, the rocks were, in many places, green with box and ivy and evergreen oak, which harmonized well with the rich yellow brown of the stone itself."

Thus it will be seen this valley has been a favorite resort for people at widely different times, and amongst others, the cave dwellers of the Paleolithic Age. As in the caves of Belgium, some of them are at a considerable height above the stream, while others are but little above the present flood line.
Mr. Dawkins refers us to the results of the exploration of a French scientist in one of the grottoes of this section, which seem to be exactly similar to the results obtained from the caves of Cresswell Crags and Kent's Cavern. The implements obtained from the two lower strata are rough choppers and rude flakes of jasper and other simple forms. Above these beds was a

stratum of black earth, underneath a sheet of stalagmite. Here were found implements of a far higher type: those of flints, consisting of flakes, saws, and scrapers, with finely chipped heads and arrow-heads, and awls and arrow-heads of bone and antler. Now these results can only be interpreted as were those in the English caverns. The lower and ruder implements belong to the men of the Drift; the later and more polished ones to the Cave-men.

Illustration of Bone Implements, Dordogne Caves.----------

Most of the relics obtained from these caverns belong to the Cave-men proper. However, the implements from one of them, known as Le Moustier, are of a rude type, and may belong to those of the Drift. But most of them are of superior make and finish. These specimens are all from caves in this vicinity.

We have seen that the men of the Drift were very widely scattered over the earth. We find, however, that the Cave-men had a much more limited range. Dr. Fraas has shown their presence in Germany. At Schussenreid, in Bavaria, was found an

open air station of these people. It was evidently a camping-ground, one of the few places where proofs of their presence have been discovered outside of caves. Here we found the usual *debris,* consisting of broken bones, charcoal, blackened hearth-stone, and implements of flint and horn. We must stop a minute to notice a bit of unexpected proof as to the severity of climate then prevailing in Europe. This deposit was covered up with sand, and on this sand were the remains of moss, sufficiently perfect to determine the kind. We are assured that it is composed of species now found only in Alpine regions, near or above the snow-line, and in such northern countries as Greenland and Spitzbergen. Dr. Fraas also proved their presence in several caves in Suabia. One known as the Hohlefels Cave was very rich in these relics. They have been found in Switzerland, as at Thayengen; but are not found south of the Alps or the Pyrenees. Men, indeed, inhabited caves in Italy, but they did not use the implements characteristic of the Cave-men. Mr. Dawkins points out that this range corresponds very nearly to that of the northern group of animals, thus differing widely from the men of the River Drift. In this connection we must notice that the reindeer is the animal whose remains are most commonly met with in the *debris* they have left in the caves. This animal surely testifies to a cold

climate. We are thus justified in concluding that the Cave-men are associated with the Arctic group of animals.

We must now turn our attention to the culture of the Cave-men. We must reflect that long ages, with great changes of climate and life, both animal and vegetable, have rolled away since the remains of these early races were sealed by the stalagmite formation in caves. The relics at their best are but scanty memorials of a people long since passed, and we can not expect, can not hope, to recover more than a general outline. But this will be found full of interest, for it is a picture of Paleolithic life and times existing in Europe long ages before the pyramids of Egypt were uplifted.

With respect to habitations, we have already seen that he took up his abode in caves, at least where they were suitable. According to their depth and the light penetrating them, he either occupied the whole extent of them, or established himself in the outlet only. About the center of the cave some slabs of stone, selected from the hardest rock such as sandstone or slate, were bedded down in the ground, and formed the hearth for cooking his food. But in no country are such resorts sufficiently numerous to shelter a large population; besides,

they, are generally at some distance from the fertile plains, where game would be most abundant. In such cases they doubtless constructed rude huts of boughs, skins, or other materials. Such an out-door settlement was the station at Solutre, France, where has been found an immense number of bones of horses, reindeers, also, though in less abundance, those of elephants, aurochs, and great lions.

Where no cave presented itself, these people made for themselves convenient sheltering places under the cover of some great overhanging rock. In various places in France such resorts have been discovered. The name of "rock shelters" has been given to such resorts. In such places, where we may suppose they built rude huts, are found rich deposits of the bones of mammals, birds, and fishes, as well implements of bone and horn.

We have frequently referred to the presence of hearths, showing that they used fire. Like other rude races, it is probable that they obtained fire by the friction of one piece of wood upon another. M. Dupont found in one of the Belgium caves a piece of iron pyrites, from which, with a flint, sparks could be struck.

Speculations have been indulged as to the probable condition of

man before he obtained a knowledge of fire. If the acquisition of fire be regarded as one of the results of human endeavor, it must surely be classed as one of the most valuable discoveries which mankind has made. We do not believe, however, that we shall ever discover relics of races or tribes of men so low in the scale as to be ignorant of the use of fire. Even some of the flints which M. Bourgeois would refer to the Miocene Age show evidence of its action.

Full-page picture of Rock Shelter at Bruniquel.----------

The men of the Caves supported life by hunting. But a very small part of their food supplies could have been drawn from the vegetable kingdom. When the climate was so severe that Alpine mosses grew at Schussenreid, acorns and like nuts would be about all they could procure from that source. The animals hunted by the Cave-men were principally reindeer, horses, bisons, and, occasionally mammoths and woolly rhinoceros. But they were not very choice in this matter, as they readily accepted as food any animal they could obtain by force or cunning. Wolves and foxes were not rejected, and in one cave large numbers of the bones of

the common water rat were obtained. We know what animals were used as food, because we find their bones split for the purpose of procuring the marrow they contained. This was evidently to them a nutritious article of diet, since they were careful to open all the bones containing it, and bones so split are frequently the only means of detecting the former presence of man in some bone caves.

We must not forget that at that time the shore of the Atlantic Ocean, during a large part of the Paleolithic Age, was situated much farther west than it is now, and so in all probability many refuse heaps are now underneath the waves. From certain drawings that are found in some French caves, we know they were used for hunting both seals and whales.

We can not doubt that the capture of a whale afforded as much enjoyment to them as it does to a tribe of Eskimos now. Bones of birds and fishes are found in many instances. The salmon appears to have been a favorite among fishes. Among the birds are found some species now only living in cold countries, such as the snowy owl, willow grouse, and flamingo. This is but another proof that the climate of Europe was then very cold.

Illustration of Whale and Seal, Incised on Bone.----------

The Cave-men were not afraid to attack animals greatly superior to them in strength. In the Hohlefels Cave in Germany were found great quantities of the broken and split bones of cave bears, an animal very similar to the grizzly, and probably its equal in strength. The reindeer was the main reliance of these tribes. Its bones are found in great abundance, and it doubtless was to them all it is to the Lapps of Europe to-day, except, of course, that it was not domesticated.

Though fire would naturally suggest some rude method of cooking, we can scarcely find a trace of such operations, and it has been a matter of conjecture how they proceeded. Sir John Lubbock thinks they boiled their food, and in the absence of pottery used wooden or skin vessels, bringing the water to a boiling point by means of stones heated red hot and thrown into the water. He points out the presence of peculiarly shaped stones found in some caves, which he thinks were used for this purpose. It is not supposed they had any articles of pottery during this epoch. This is quite an important point, because a knowledge of pottery marks an important epoch in the culture of

a people.

Illustration of Cave Bear, Incised on Slate.----------

A people possessed of this knowledge have passed from Savagism into the lower status of Barbarism. A piece of pottery is as little liable to destruction as a piece of bone, and so, had those people possessed pottery, there is no reason why pieces of it should not be found in every refuse heap, and amongst the *debris* of all caves. But such is not the case; no fragments of pottery have yet been found which can be referred with confidence to the epoch of the Cave-men.

Some speculations have been indulged in as to whether the men of this age were cannibals or not. It need occasion no surprise if they were, since ancient writers assert that even during historical times this practice prevailed in Europe. Though not definitely proven there are many facts difficult of explanation, except on this supposition. However, it may well be that this, after all, only amounted to the custom of eating parts of an enemy killed in battle, as certain modern savages do

that we would not call cannibals.

It is not necessary to speak at much length of the methods of hunting. They had bows and arrows, daggers of reindeer horn, spears tipped with flint or bone, and harpoons. Besides, they made a formidable club of the lower jaw-bone of the cave-bear with its canine tooth still left in its place. Fishing with nets is not supposed to have been known, Harpooning was probably their favorite way. M. G. DeMortillet thinks they fished as follows: They fastened a cord to the middle of a small splinter of bone. This was then baited, and when swallowed by the fish, was very certain to get caught in the body.

We know that rude tribes of to-day have many means of snaring animals. Doubtless similar scenes were enacted on their primeval hunting-grounds. French books contain illustrations of the men of this period driving game over precipitous sides. They had no dogs to assist them in the hunt, and though reindeer were around them in great abundance, it is not supposed that they thought of domesticating them.

Man is the only animal which seeks to protect his body from the Summer's heat or the cold of Winter by the use of clothing.

We are, unfortunately, not able to present many details of the dress of man during the early Stone Age. We are, however, quite certain that when the climate was severe enough to permit such animals as the musk-sheep and the reindeer to inhabit South-western Europe, man must have been provided with an abundance of warm clothing, though doubtless rudely made and fashioned. Many reindeer horns found in France are cut and hacked at the base in such a way as to indicate that it was done when removing the skins. We also know that the rudest of savage tribes are never at a loss for some process of tanning hides and rendering them fit for use. From the immense number and variety of scrapers found among the cave *debris.* we are sure the preparation of clothing occupied no inconsiderable portion of their time. We also find numerous awls and splinters of flint and bone, which they doubtless used in exactly the same manner as similar tools are used by the Lapps to-day in Europe, that is, to pierce holes in the hides, through which to pass their rude needle and thread. The needles are made of reindeer horn, and they were not only smoothly polished, but the eyes are of such a minute size, and withal so regularly made, that many at first could not believe they were drilled by the use of flint alone. This, however, has been shown to be the case by actual experiments. The thread employed was reindeer tendons, for bones

of these animals are found cut just where they would he cut in removing these tendons. This cut shows that they protected their hands by means of long gloves of three or four fingers.

Illustration of Glove, Incised on Bear's Tooth.----------

We have thus far been considering those arts which pertain more directly to living. We have presented some sketches found engraved on pieces of bone. We first noticed this among the relics found in one of the Creswell caves in England. It was also noticed in Belgium. It was among the Cave-men of Southern France that this artistic trait became highly developed. Among the reindeer hunters of the Dordogne were artists of no mean ability. We must pause a minute and mark the bearing of this taste for art. We have seen many reasons for supposing the men of the caves much farther advanced in the scale of culture than those of the Drift, but we have also seen that we can not rank them higher than the highest grade of savages.

Sir John Lubbock thus speaks of them: "In considering the probable condition of these ancient Cave-men, we must give them

full credit for their love of art, such as it was; while, on the other hand, the want of metal, of polished flint implements, and even of pottery, the ignorance of agriculture, and the apparent absence of all domestic animals, including even the dog, certainly imply a very low state of civilization."

They were certainly not as far advanced in civilization as the next race we will describe, yet the Neolithic people had no such skill as was possessed by the cave-men. This need not surprise us, because "an artistic feeling is not always the offspring of civilization, it is rather a gift of nature. It may manifest its existence in the most barbarous ages, and may make its influence more deeply felt in nations which are behind in respect to general progress than in others which are more deeply advanced in civilization."

Illustration of Reindeer Grazing.----------

In regard to the objects themselves, a glance at the illustrations show us that they are quite faithful sketches of the animals at that time common. As might be expected, sketches

of the reindeer are numerous. This cut is regarded as the highest example of Paleolithic art, sketched on a piece of horn and found in Switzerland. The animal is grazing, and the grass on which it feeds is seen below. We have on a piece of slate the outlines of a group of reindeer, generally considered as representing a fight, though it may mean a hunt, and that the hunter has succeeded in killing a portion of the herd. Some, as we see, are on the ground.

Illustration of a Group of Reindeers.---------

Illustration of Man and Other Animals.--------

It would be exceedingly interesting could we but find well executed sketches of the men of this period, but, unfortunately, with one or two exceptions, no representations, however rude, have yet been discovered of the human form. Perhaps an explanation of this fact may be found in the well-known reluctance of savage tribes to have any engravings taken of themselves, and we can well imagine that if any one was known to

make drawings of human beings he would be regarded with suspicious distrust, and it would hardly be a safe accomplishment to possess. One very curious group represents a man, long and lean, standing between two horses' heads, and by the side of a long serpent or fish, having the appearance of an eel. On the reverse side of this piece of horn were represented the heads of two aurochs or bisons. Mr. Dawkins thinks this also represents a hunting sketch, and that the man is in the act of striking one of the horses with a spear.

Illustration of Fish, Incised on Bear's Tooth.----------

Illustration of Ibex.----------

On, a fragment of spear-head found in France several human hands were engraved, but having only four fingers each. On this point Mr. Lartet assures us that some savage tribes still depict the hand without the thumb. Representations of birds and reptiles are very rare; fishes are more common. On a piece of reindeer's horn was found this representation of the head and

chest of an ibex. Of special interest to us is a representation of a mammoth found engraved on a piece of mammoth tusk in one of the Dordogne caves. We have no doubt that the artist who engraved it was perfectly familiar with the animal itself.

Illustration of Mammoth--La Madeline Cave, France.----------

Their artistic skill was not confined to the execution of drawings. They frequently carved pieces of reindeer horn into various animal forms. Our next cut shows us a dagger, the handle of which is carved to imitate a reindeer. It will be seen how the artist has adapted the position of the animal to the necessities of the case. Flowers are very seldom represented; but one implement from France has a very nice representation of some flowering plant engraved on it.

Take it all in all, the possession of this artistic instinct is certainly remarkable--the more so when we remember the rudeness of his surroundings, and the few and simple means at his command for work. "A splinter of flint was his sole graving tool; a piece of reindeer horn, or a flake of slate or ivory, was the

only plate on which primitive man could stamp his reproduction of animated nature."

Illustration of Reindeer Carved on Dagger Handle.-------

Some speculations have been indulged in as to whether we have any traces of a government amongst the Paleolithic people. That they had some chief or leader is more than probable. In the caves of France we find a number of fragments of reindeer horn. Generally speaking, they show evidence of a good deal of care in making them. They are carved and ornamented with sketches of various animals, and invariably have one or more holes bored in the base. The idea has been quite freely advanced, that these are emblems of authority. And some have pointed out, that, though they are too light for use as weapons, yet, their "frequent occurrence, and uniformity of type, show that they possess a conventional significance." Mr. Geikie says that these conjectures "are mere guess-work." And Mr. Dawkins points out that they are very similar in design and ornament with an implement of the Eskimos known as an "arrow-straightener."

Whatever may be our conclusions in regard to these ornamented pieces of reindeer horn, we can not doubt but that their social instincts found expression in some sort of alliance for the common good. This is shown by several facts: such, for instance, as the evidence of trade or barter between localities considerable distances apart. The inhabitants of Belgium must have gone to what is now Southern France to procure the flint they used. They also procured, from the same source, fossil sea-shells, which they valued highly. We also notice the fact, that certain localities appear to have been used as the place of manufacture for certain articles, to the exclusion of others. In other words, the primitive people appear to have learned the great utility of a division of labor. One of the caves in Belgium appears to have been used as a place to make flint implements. Over twenty thousand articles of flint were found in this cave. In France, while in one cave the implements were all of the spear-head type, in a neighboring cave horn was almost the only article used in the manufacture of implements.

We must not, however, form an exalted idea of their trade--it was simply barter in a rude state of society.

Illustration of Flowers on Reindeer's Horn.--------

Various opinions have been held as to whether we have any trace of a religious belief. Theoretically speaking, they had some sort of a religion, though doubtless very vague and indistinct; for we know of no nation as far advanced as they were destitute of it. It has been pointed out, that the bones of some animals, as the horse, were very rare, and their absence explained as the result of superstitious reasons. It has also been conjectured that some of the perforated bones and teeth of animals found in various deposits were amulets worn for religious purposes; and some have gone so far as to infer, that the ornamentations on some of these so-called amulets represent the sun, and that, consequently, sun-worship prevailed among the Cave-men. While these various conjectures are, of course, possible, it is equally certain they are all "mere guess-work."

Illustration of Ornamented Reindeer Horn----------

Early explorers describe with considerable degree of confidence

the manner of burial among the Cave-men, and inferred from the remains found buried with the bodies that they had some notion of a life beyond the grave--and, accordingly, placed near the body food and drink to support him on his journey, weapons wherewith to defend himself, and his favorite implements, so that, arrived at the land of spirits, he would be well provided for. These result are not borne out by later investigations. The instance mentioned most prominently, that of the burial cave at Aurignac, France, has been shown to have no bearing on the question, as every thing indicates that the burials were of a much later date.

We have yet a most important question before us--one that is still engaging the attention of scientific men in Europe. That is the question of race. Who were these early tribes? Are they in any way connected with the men of the Drift? Have we any representations of them now living upon the earth? On these questions there is quite a diversity of opinion. In various caves in France and Belgium, skulls and other bones of the human skeleton have been found. These have been studied with care by the best scholars in Europe; and B. Carfares has set forth the results in his various works, in which he connects them, not only with the men of the River Drift, but with the race of men

that inhabited Europe during the succeeding Neolithic Age, and, indeed, with men now living in France and Belgium.

There is no question as to the correctness of these inferences --the only one is, whether the skulls and fragmentary skeletons are really remains of the Cave-men. This must be made perfectly clear and unquestioned before we are to accept them. Mr. Darkens reviews the various cases where skeletons have been found in caves. He points out that, in every instance, very serious doubts can be raised as to whether they are really remains of the Cave-men or not.

Until these objections are met, we do not see how the opinion of B. Carfares (above) can be accepted. But if these instances are not accepted, then, in all other instances where there is no doubt, the remains are in such a fragmentary condition that no conclusion can be made from them. So as far as remains of the human skeleton are concerned, we can form no conclusions as to the race to which the Cave-men belonged.

We have already noted, that the Cave-men came into Europe much later than the men of the Drift, and that their range was very limited, corresponding, in fact, with that of the northern group

of animals. When the cold of the Glacial Age passed away, the musk-sheep, reindeer, and other animals, were driven out of Europe. They are found now only in high northern latitudes, such as Greenland. Mr. Darkens thinks that there, also, are to be found the Cave-men of the Paleolithic Age, now known as the Eskimos. Though not accepted by all authorities, yet some of our best scholars find much to commend in this theory.

We have undoubted proofs that, in America, the Eskimos formerly lived much farther south. And Dr. Abbot thinks the Paleolithic implements discovered in New Jersey, bearing such striking resemblance to those of Europe, are undoubtedly their work. Therefore, there is no absurdity in asserting that they once lived in Western Europe; the more so, when we reflect that the climate, the animals--in fact, all their surroundings--must have been similar to those of their present habitats.

When we come to examine the customs and habits of these Eskimos, we are at once struck with their resemblance to what we have seen was the probable state of life among the Cave-men. At Solute, for instance, we have vast refuse heaps of bones of animals. We find similar heaps around the rude huts of the Eskimos to-day. Captain Parry describes one as follows:

"In every direction round the huts were lying innumerable bones of walruses and seals, together with skulls of dogs, bears, and foxes."

Other points of comparison strike us when reading Sir John Lubbock's account of their habits and customs. For instance: "Their food, if cooked at all, is broiled or boiled; their vessels, being of stone or wood, can not, indeed, be put on the fires, but heated stones are thrown in until the water becomes hot enough and the food is cooked." "Their food consists principally of reindeer, musk-ox, walrus, seals, birds, and salmon. They will, however, eat any kind of animal food. They are very fond of fat and marrow, to get at which they pound the bones with a stone." "The clothes of the Eskimos are made from the skins of the reindeer, seals, and birds, sewn together with sinews. For needles they use the bones of either birds or fishes." "The Eskimos have also a great natural ability for drawing. In many cases they have made rude maps for our officers, which have turned out to be substantially correct. Many of their bone implements are covered with sketches."

Illustration of Eskimo Art.----------

In this cut we have a bone drill on which are sketched reindeer, geese, a braider or flat-bottomed boat, a tent around which various articles of clothing are hung up to dry, a woman apparently engaged in the preparation of food, and a hunting scene.

Now, we know that savage tribes, widely separated by time and space, will, after all, under the pressure of common necessities, invent much the same implements and live much the same life. But still, where every thing seems to coincide, the climate, the animals, the mode of life proved the same, and especially when both are seen possessed of a common artistic skill, together with the known fact that in the Western Continent the Eskimos did formerly live much farther south; there is surely a strong case made out, and therefore the probabilities are that the Eskimos are the representatives of the Cave-men of Europe. And yet we must be cautious on this point; or rather we remember that the phrase, "predecessors of the Eskimos," does not imply that they were in all respects like them. An examination of the rude sketches of the Cave-men left by themselves seems to indicate that the whole body was covered

with hair. "The hunter in the Antler from Duluth Cave has a long, pointed beard, and a high crest of hair on the poll utterly unlike the Eskimo type. The figures are also those of a slim and long-jointed man."

This completes our review of the Paleolithic people, and it only remains to present some general conclusions. The Glacial or Pleistocene Age is seen to have been of immense duration, and characterized by great changes in climate. We have found that two races of men occupied Europe during this time. The men of the River Drift are the most ancient.

We have seen that they can be traced over wide-extended areas. They seem to have invaded Europe, along with the great invasion of animals from Asia, constituting the temperate group of animals; and with those animals they probably shifted back and forth, as the cold of the Glacial Age increased or waned. These people seem to have completely vanished. At a later date, when the cold of the Glacial Age was once more severe, associated with animals now living only in high northern latitudes, came the Cave-men, whose discussion has formed the subject of this chapter.

It will be seen how much we owe to patient investigators. The results are, indeed, bewildering. They make us acquainted with a people the very existence of whom was not known a few years back. Though the whole life of those ancient races seemed hopelessly lost in the night of time, the gloom is irradiated by the light of modern science, which lays before our astonished vision the remains of arts and industries of the primitive tribes that occupied Europe during the morning-time of human life.

REFERENCES

(1) The manuscript of this chapter was submitted to Prof. B. B. Wright, of Overlain, for criticism.

(2) On the formation of caves consult Geikie's "Prehistoric Europe," p. 71; also Evans's "Ancient Stone Implements," p. 429.

(3) Evans's "Ancient Stone Implements," b. 445.

(4) Pronounced Bret'-cha, a rock composed of fragments of older rock, united by a cement.

(5) Geikie's "Prehistoric Europe," p. 92.

(6) Pengelly, quoted by Geikie, "Prehistoric Europe," p. 93.

(7) Evans's "Ancient Stone Implements," p. 462.

(8) Evans's "Ancient Stone Implements," p. 463.

(9) Geikie's "Prehistoric Europe," p. 102.

(10) Mr. Dawkins ("Early Man in Britain," p. 203) does not consider M. Dupont justified in dividing the remains found in the caverns of Belgium into two epochs. He considers them to be the remains of the same people, some tribes being, perhaps, farther advanced than others. Mr. Dawkins is, of course, high authority, but we think his argument could also be applied to prove there was no real difference between the men of the River Drift and the so-called Cave-men. This, in fact, is the opinion of many, including Mr. Evans, who is exceptionally well qualified to judge of these remains. We think, however, in view of the evidence adduced by Mr. Pengelly, Mr. Geikie, Mr. Dawkins, and others, few will venture to doubt that there is a wide difference between the men of the River Drift and those of the Caves.

(11) "Prehistoric Times," p. 330.

(12) "Early Man in Britain," p. 198.

(13) French writers make four divisions of these caves, according to the degree of finish, which the specimens show. Mr. Dawkins does not think the difference in the implements sufficient to justify this view. With the possible exception of Le Moustier, as stated above, we think his view correct, which is also the opinion of Mr. Evans. ("Ancient Stone Implements,"

p. 439.)

(14) Rau's "Early Man in Europe," p. 88.

(15) Dawkins's "Early Man in Britain," p. 205.

(16) Ibid., p.

(17) It is, however, thought that the station was used as a camping-ground by very different people, at widely different times.

(18) Lubbock's "Prehistoric Times," p. 434.

(19) "Prehistoric Times," p. 335.

(20) Morgan's "Ancient Society," p. 12.

(21) Lubbock's "Prehistoric Times," p. 338. J. C. Southall, in his valuable work, "Recent Origin of Man," p. 195, *et seq.*, argues that pottery was known at this time, and cites instances where it is stated to have been found. This is the opinion of Figuier also. ("Primitive Man," p. 54.) But Mr. Dawkins points out that these pieces of pottery are clearly of a Neolithic style, and does not think it proven that they are of Paleolithic age. Mr. Geikie also denies that there is any proof that they were acquainted with the potter's art. ("Prehistoric Europe," p. 18.) So the highest place in the scale of civilization we can assign these people to is that of Upper Savageism.

(22) Rau's "Early Man in Europe," p. 79;

(23) Geikie's "Prehistoric Europe," p. 22.

(24) Figuier's "Primitive Man," p. 90.

(25) Dawkins's "Early Man in Britain," p. 210.

(26) "Prehistoric Times," p. 341.

(27) Figuier's "Primitive Man," p. 105.

(28) Figuier's "Primitive Man," p. 111.

(29) Figuier's "Primitive Man," p. 105.

(30) Figuier's "Primitive Man," p. 102.

(31) Rau's "Early Man in Europe," p. 73.

(32) "Prehistoric Europe," p. 18.

(33) Dawkins's "Early Man in Britain," p. 237.

(34) Figuier's "Primitive Man," p. 117.

(35) Ibid., p. 118.

(36) Ibid., pp. 94 and 95.

(37) This, as Sir John Lubbock points out, depends on our meaning of the word "religion." ("Prehistoric Times," p. 589.)

(38) "The principal instance are Cro-Magnon, Frontal, and Furforz, in Belgium; Aurignac, Bruniquel, and Mentone, in France." "Cave-Hunting," chap. vii.

(39) "Contributions to N. A. Ethnology," vol. i, p. 102; "U.S. Geographical Survey West of the 100th Meridian," vol. vii, p. 12; Abbott's "Primitive Industry," p. 517.

(40) "Primitive Industry," 518.

(41) Quoted by Lubbock,"Prehistoric Times," p. 507.

(42) Dawkins's "Early Man in Britain," p. 242.

(43) Prof. Grant Allen, *Popular Science Monthly*, November, 1882, p. 99.

END OF CHAPTER IV**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Chapter V

ANTIQUITY OF THE PALEOLITHIC AGE.

Interest in the Antiquity of man--Connected with the Glacial Age--The Subject Difficult--Proofs of a Glacial Age--State of Greenland to-day--The Terminal Moraine--Appearance of the North Atlantic--Interglacial Age--Causes of the Glacial Age--Croll's Theory--Geographical causes--The two theories not Antagonistic--The date of the Glacial Age--Probable length of the Paleolithic Age--Time since the close of the Glacial Age--Summary of results.

As we have already remarked, geological periods give us no insight as to the actual passage of years. To say that man lived in the Glacial Age, and that we have some faint traces of his presence in still earlier periods, after all conveys to our minds only vague ideas of a far-away time. The more a geologist studies the structure of the earth, the more impressed is he with the magnitude of the time that must have passed since "The Beginning." At present, however, there are no means known of accurately measuring the time that has passed. It is just as well that it is so, since, were it known, the human mind would

be utterly incapable of comprehending it. But as to the antiquity of man, it is but natural that we should seek more particularly to solve the problem and express our answer in some term of years.

Now, we have seen that the question of the antiquity of man is intimately connected with that of the Glacial Age. That is to say, the relics of man as far as we know them in Europe, are found under such circumstances that we feel confident they are not far removed from the period of cold. For it will be found that those conservative scholars who do not think that man preceded the Glacial Age, or inhabited Europe during the long course of years included in that period, do think he came into Europe as soon as it passed away. So, in any case, if we can determine the date of the Glacial Age, we shall have made a most important step in advance in solving the problem of the antiquity of man himself. So it seems to us best to go over the subject of the Glacial Age again, and see what conclusions some of our best thinkers have come to as to its cause, when it occurred, and other matters in relation to it.

It is best to state frankly at the outset that this topic is one of the great battle-grounds of science to-day, and that there

are as yet but few points well settled in regard to it.

One needs but attempt to read the literature on this subject to become quickly impressed with the necessity of making haste slowly in forming any conclusions. He must invoke the aid of the astronomer, geologist, physical-geographer, and physicist.

Yet we must not suppose that questions relating to the Glacial Age are so abstruse that they are of interest only to the scholar. On the contrary, all ought to be interested in them.

They open up one of the most wonderful chapters in the history of the world. They recall from the past a picture of ice-bound coasts and countries groaning under icy loads, where now are harbors enlivened by the commerce of the world, or ripening fields attesting the vivifying influence of a genial sun.

Let us, therefore, follow after the leaders in thought. When we come to where they can not agree we can at least see what both sides have to say.

Somewhat at the risk of repetition, we will try and impress on our readers a sense of the reality and severity of the Glacial Age. There is danger in regarding this as simply a convenient theory that geologists have originated to explain some puzzling facts, that it is not very well founded, and is liable to give way any day to some more ingenious explanation. On the contrary,

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this whole matter has been worked out by very careful scholars. "There is, perhaps, no great conclusion in any science which rests upon a surer foundation than this, and if we are to be guided by our reason at all in deducting the unknown from the known, the past from the present, we can not refuse our assent to the reality of the Glacial Age of the Northern Hemisphere in all its more important features. At the present day glaciers do exist in several places on the earth. They are found in the Alps and the mountains of Norway, and the Caucasus, in Europe. The Himalaya mountains support immense glaciers in Asia; and in America a few still linger in the more inaccessible heights of the Sierra Nevada. It is from a study of these glaciers, mainly however, those of the Alps, that geologists have been enabled to explain the true meaning of certain formations they find in both Europe and America, that go by the name of drift.

When in an Alpine valley we come upon a glacier, filling it from side to side, there will be noticed upon both sides a long train of rock, drift, and other *debris* that have fallen down upon its surface from the mountain sides. If two of these ice-rivers unite to form one glacier, two of these trains will then be borne along in the middle of the resulting glacier. As this glacier continues down the valley, it at length reaches

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a point where a further advance is rendered impossible by the increased temperature melting the ice as fast as it advances. At this point the train of rocks and dirt are dumped, and of course form great mounds, called moraines. The glacier at times shrinks back on its rocky bed and allows explorers to examine it.

In such cases they find the rocks smoothed and polished, but here and there marked with long grooves and striae. These points are learned from an examination of existing glaciers. Further down the valley, where now the glaciers never extend, are seen very distinctly the same signs. There are the same moraines, striated rocks, and bowlders that have evidently traveled from their home up the valley. The only explanation possible in this case is that once the glaciers extended to that point in the valley.

It required a person who was perfectly familiar with the behavior of Alpine glaciers, and knew exactly what marks they left behind in their passage, to point out the proofs of their former presence in Northern Europe and America, where it seems almost impossible to believe they existed. Such a man was Louis Agassiz, the eminent naturalist. Born and educated in

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Switzerland, he spent nine years in researches among the glaciers of the mountains of his native country. He proved the former wide extension of the glaciers of Switzerland. With these results before them, geologists were not long in showing that there had once been glacial ice over a large part of Europe and North America.

The proofs in this case are almost exactly the same as those used to show that the ancient glaciers of Switzerland were once larger than now. But as the great glaciers of the glacial age were many times larger than any thing we know of at the present day, there were of course different results produced.

For instance, the water circulating under Alpine glaciers is enabled to wash out and carry away the mass of pulverized rock and dirt ground along underneath the ice. But when the glaciers covered such an enormous extent of country as they did in the Glacial Age, the water could not sweep away this detritus, and so great beds of gravel, sand, and clay would be formed over a large extent of country. But to go over the entire ground would require volumes; it is sufficient to give the results.

The interior of Greenland to-day is covered by one vast sea of

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ice. Explorers have traversed its surface for many miles; not a plant, or stone, or patch of earth is to be seen. In the Winter it is a snow-swept waste. In the Summer streams of ice-cold water flow over its surface, penetrating here and there by crevasses to unknown depths. This great glacier is some twelve hundred miles long, by four hundred in width. Vast as it is, it is utterly insignificant as compared with the great continental glacier that geologists assure us once held in its grasp the larger portion of North America.

The conclusions of some of our best scholars on this subject are so opposed to all that we would think possible, according to the present climate and surroundings, that they seem at first incredible, and yet they have been worked out with such care that there is no doubt of the substantial truth of the results.

The terminal moraine of the great glacier has been carefully traced through several States. We now know that one vast sea of ice covered the eastern part of North America, down to about the thirty-ninth parallel of latitude. We have every reason to think that the great glacier, extending many miles out in the Atlantic, terminated in a great sea of ice, rising several hundred feet perpendicularly above the surface of the water.

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Long Island marks the southern extension of this glacier. From there its temporal moraine has been traced west, across New Jersey and Pennsylvania, diagonally across Ohio, crossing the river near Cincinnati, and thence west across Indiana and Illinois. West of the Mississippi it bears off to the north-west, and finally passes into British America.

All of North America, to the north and northeast of this line, must have been covered by one vast sea of ice. Doubtless, as in Greenland to-day, there was no hill or patch of earth to be seen, simply one great field of ice. The ice was thick enough to cover from sight Mt. Washington, in New Hampshire, and must have been at least a mile thick over a large portion of this area, and even at its southern border it must in places have been from two hundred to two thousand feet thick. This, as we have seen, is a picture very similar to what must have been presented by Europe at this time.

Illustration of Antarctic Ice Sheet.----------

The Northern Atlantic Ocean must have presented a dreary aspect.

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Its shores were walls of ice, from which ever and anon great masses sailed away as icebergs. These are startling conclusions. Yet, in the Southern Hemisphere to-day is to be seen nearly the same state of things. It is well-known that all the lands around the South Pole are covered by a layer of ice of enormous thickness. Sir J. A. Ross, in attempting to reach high southern latitudes, while yet one thousand four hundred miles from the pole, found his further progress impeded by a perpendicular wall of ice one hundred and eighty feet thick. He sailed along that barrier four hundred and fifty miles, and then gave up the attempt. Only at one point in all that distance did the ice wall sink low enough to allow of its upper surface being seen from the mast-head. He describes the upper surface as an immense plain shining like frosted silver, and stretching away as far as eye could reach into the illimitable distance.

The foregoing makes plain to us one phase of the Glacial Age. Though it may not be quite clear what this has to do with the antiquity of man, yet we will see, in the sequel, that it has considerable. As to the periods of mild climate that are thought by some to have broken up the reign of cold, we do not feel that we can say any thing in addition to what has been said in a former chapter.

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We might, however, say, that the sequences of mild and cold climate are not as well made out in America as they seem to be in Europe; or at least our geologists are more cautious as to accepting the evidence as sufficient. And yet such evidences are not wanting: as in Europe, at various places, are found layers of land surfaces with remains of animals and plants, but both above and below such surface soil are found beds of bowlder clay. These offer undeniable evidence that animals and plants occupied the land during temperate inter-glacial epochs, preceded and followed by an Arctic climate, and ice-sheets like those now covering the interior of Greenland, and the Antarctic Continent.

We have thus, though somewhat at length, gone over the evidence as to the reality and severity of the Glacial Age. It was during the continuance of such climate that Paleolithic man arrived in Europe, though it was not perhaps until its close. We must not lose sight of the fact that our principal object at present is to determine, if we can, a date for either the beginning or ending of this extraordinary season of cold, and thereby achieve an important step in determining the antiquity of man.

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A moment's consideration will show us that a period of cold sufficient to produce over a large portion of the Northern Hemisphere the results we have just set forth must have a cause that is strange and far-reaching. It can not be some local cause, affecting but one continent, since the effect produced is observed as well in Europe as in America.

Every year we pass through considerable changes in climate. The four seasons of the year seem to be but an annual repetition, on a very small scale of course, of the great changes in the climate of the earth that culminated in the Glacial Age; though we do not mean to say, that periods of glacial cold come and go with the regularity of our Winter. The changes in the seasons of the year are caused by the earth's position in its orbit, and its annual revolution around the sun. It may be that the cause of the Glacial Age itself is of a similar nature; in which case it is an astronomical problem, and we ought, by calculation, to determine, with considerable accuracy, dates for the beginning and ending of this epoch.

Nothing is clearer than that great fluctuations of climate have occurred in the past. Many theories have been put forth in explanation. It has been suggested that it was caused by loss of

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heat from the earth itself. That the earth was once a ball of incandescent matter, like the sun, and has since cooled down, is of course admitted. More than that, this process still continues; and the time must come when the earth, having yielded up its internal heat, will cease to be an inhabitable globe.

But the climate of the surface of the earth is not dependent upon the heat of the interior. This now depends "according to the proportion of heat received either directly or indirectly from the sun; and so it must have been during all the ages of which any records have come down to us." Some have supposed that the sun, traveling as it does through space, carrying the earth and the other planets with him, might, in the course of ages, pass through portions of space either warmer or colder than that in which it now moves. When we come to a warm region of space, a genial climate would prevail over the earth; but, when we struck a cold belt, eternal Winter would mantle a large part of the globe with snow and ice. This, of course, is simply guess-work. No less than seven distinct causes have been urged; most of them either purely conjectural, like the last, or manifestly incompetent to produce the great results which we have seen must be accounted for. But, amongst these, two causes have been advanced--the one astronomical, the other geographical; and, to the one or the other, the majority of

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scholars have given their consent.

It will be no harm to see what can be said in favor of both theories. So, we will ask the reader's attention, as it is our earnest desire to make as plain as possible a question that has so much to do with our present inquiry. In the course of our investigations, we can not fail to catch glimpses of wonderful changes in far away times; and can not help seeing what labor is involved in the solution of all questions relating to the same.

The earth revolves around the sun in an orbit called an ellipse. This is not a fixed form, but slowly varies from year to year. It is now gradually becoming circular. It will, however, not become an exact circle. Astronomers assure us that, after a long lapse of time, it will commence to elongate as an ellipse again. Thus, it will continually change from an ellipse to an approximate circle, and back again. In scientific language, the eccentricity of, the earth's orbit is said to increase and decrease.

Illustration of Earth's Orbit.----------

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In common language we would state that the shape of the path of the earth around the sun was sometimes much more elongated and elliptical than at others. The line drawn through the longest part of an ellipse is called the major axis. Now the sun does not occupy the center of this line, but is placed to one side of it; or, in other words, occupies one focus of the ellipse. It will thus be seen that the earth, at one time during its yearly journey, is considerably nearer to the sun than at others. The point where it approaches nearest the sun is called *Perihelion,* and the point where it reaches the greatest distance from the sun is called its *Aphelion.* It will be readily seen that the more elliptical its orbit becomes the greater will be the difference between the perihelion and aphelion distance of the sun. At present the earth is about three millions of miles nearer the sun in perihelion than in aphelion. But we must remember the orbit of the earth is now nearly circular. There have been times in the past when the difference was about thirteen millions of miles. We must not forget to add, that the change in the shape of the earth's orbit is not a regular increase and decrease between well-known extremes. It is caused by the attraction of the other planets.

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It has been calculated at intervals of ten thousand years for the last million years. In this way it has been found that "the intervals between connective turning points are very unequal in length, and the actual maximum and minimum values of the eccentricity are themselves variable. In this way it comes about that some periods of high eccentricity have lasted much longer than others, and that the orbit has been more elliptical at some epochs of high eccentricity than at others." We have just seen that the earth is nearer the sun at one time of the year than at another. At present the earth passes its perihelion point in the Winter of the Northern Hemisphere, and its aphelion point in the Summer. We will for the present suppose that it always reaches the points at the same season of the year. Let us see if the diminished distance from the sun in Winter has any thing to do with the climate.

If so, this effect will be greatly magnified during a period of high eccentricity, such as the earth has certainly passed through in the past. We will state first, that the more elliptical the orbit becomes, the longer Summer we have, and the shorter Winter. Astronomically, Spring begins the 20th of March, and Fall the 22d of September. By counting the days between the epochs it will be found that the Spring and Summer part of the

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year is seven days longer than the Fall and Winter part. But if the earth's orbit becomes as highly eccentrical as in the past, this difference would be thirty-six days.

This would give us a long Spring and Summer, but a short Fall and Winter. This in itself would make a great difference. We must beer in mind, however, that at such a time as we are here considering, the earth would be ten millions of miles nearer the sun in Winter than at present. It would certainly then receive more heat in a given time during Winter than at present. Mr. Croll estimates that whereas the difference in heat received during a given time is now one-fifteenth, at the time we are considering it would be one-fifth. Hence we see that at such a time the Winter would not only be much shorter than now, but at the same time would be much milder.

These are not all the results that would follow an increase of eccentricity. The climate of Europe and North America is largely modified by those great ocean currents--the Gulf Stream and the Japan current. Owing to causes we will not here consider, these currents would be greatly increased at such a time. As a result of these combined causes, Mr. Croll estimates that during a period of high eccentricity the difference between Winter and

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Summer in the Northern Hemisphere would be practically obliterate. The Winter would not only be short, but very mild, and but little snow would form, while the sun of the long Summers, though not shining as intense as at present, would not have to melt off a great layer of snow and ice, but the ground became quickly heated, and so warmed the air. Hence, if Mr. Croll be correct, a period of high eccentricity would certainly produce a climate in the Northern Hemisphere such as characterized many of the mild interglacial epochs as long as the earth passed its perihelion point in Winter.

We have so far only considered the Northern Hemisphere. As every one knows, while we have Winter, the Southern Hemisphere has Summer. So at the very time we would enjoy the mild short Winters, the Southern Hemisphere would be doomed to experience Winters of greatly increased length and severity. As a consequence, immense fields of snow would be formed, which, by pressure, would be changed to ice, and creep away as a desolating glacier. It is quite true that the short Summer sun would shine with increased warmth, but owing to many causes it would not avail to free the land from snow and ice.

As Mr. Geikie points out, "An increased amount of evaporation

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would certainly take place, but the moisture-laden air would be chilled by coming into contact with the vast sheets of snow, and hence the vapor would condense into thick fogs and cloud the sky. In this way the sun's rays would be, to a large extent, cut off, and unable to reach the earth, and consequently the Winter's snow would not be all melted away." Hence it follows that at the very time the Northern Hemisphere would enjoy a mild interglacial climate, universal Spring, so to speak, the Southern Hemisphere would be encased in the ice and snow of an eternal Winter.

But the earth has not always reached its perihelion point during the Winter season of the Northern Hemisphere. Owing to causes that we need not here consider, the earth reaches its perihelion point about twenty minutes earlier each year, so if it now passes its perihelion in Winter of the Northern Hemisphere, in about ten thousand years from now it will reach it in Summer, and in twenty-one thousand, years it will again be at perihelion in Winter. But see what important consequences follow from this. If during a period of high eccentricity we are in the enjoyment of short mild Winters and long pleasant Summers, in ten thousand years this would certainly be changed. Our Summer season would become short and heated; our Winters long and intensely cold.

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Year by year it would be later in the season before the sun could free the land from snow, and at length in deep ravines and on hill-tops the snow would linger through the brief Summer, and the mild interglacial age will have passed away, and again the Northern Hemisphere will be visited by snow and ice of a truly. Glacial Age. If, therefore, a period of high eccentricity lasts through the many thousand years, we must expect more than one return of glacial cold interspersed by mild interglacial climates.

We have tried in these last few pages to give a clear statement of what is known as Croll's theory of the Glacial Age. There is no question but what the earth does thus vary in its position with regard to the sun, and beyond a doubt this must produce some effect on the climate, and we can truthfully state that the more the complicated question of the climate of the earth is studied, the more grounds do scholars find for affirming that indirectly this effect must have been very great. And yet we can not say that this theory is accepted as a satisfactory one even by the majority of scholars. Many of those who do not reject it think it not proven. Therefore, before interrogating the astronomer as to the data of the Glacial Age, according to the terms of this theory, let us see what other causes are, adduced;

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then we can more readily accept or reject the conclusions as to the antiquity of man which this theory would necessitate us to adopt.

The only other cause to which we can assign the glacial cold, that is considered with any favor by geologists, is geographical; that is to say, depending on the distribution of land and water. Glaciers depend on the amount of snow-fall. In any country where the amount of snow-fall is so great that it is not all evaporated or melted by the Summer's sun, and consequently increases from year to year, glaciers must soon appear, and these icy rivers would ere-long, flow away to lower levels. If we suppose, with Sir Charles Lyell, that the lands of the globe were all to be gathered around the equator, and the waters were gathered around the poles, it is manifest that there would be no such a thing as extremes of temperature, and it is, perhaps, doubtful whether ice would form, even in polar areas. At any rate, no glaciers could be formed, as there would be no land on which snow could gather in great quantities.

If, however, we reverse this picture, and conceive of the land gathered in a compact mass around the poles, shutting out the water, but consider the equatorial region of the earth to be

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occupied by the waters of the ocean, we would manifestly have a very different scene. From the ocean moisture-laden winds would flow over the polar lands. The snowfall would necessarily be great. In short, we can not doubt but what all the land of the earth would be covered with glaciers.

Although these last conceptions are purely hypothetical, they will serve the good purpose of showing the great influence that the geographical distribution of land and water have on the climate of a country. Of one thing, however, geologists have become more and more impressed of late years. That is, that continents and oceans have always had the same relative position as now; that is to say, the continents have followed a definite plan in their development. The very first part of North America to appear above the waters of the primal sea clearly outlined the shape of the future continent. Mr. Dana assures us that our continent developed with almost the regularity of a flower. Prof. Hitchcock also points out that the surface area of the very first period outlined the shape of the continent. "The work of later geological periods seems to have been the filling up of the bays and sounds between the great islands, elevating the consolidated mass into a continental area." So it is not at all probable that the lands of the globe were ever grouped, as

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we have here supposed them.

This last statement is liable, however, to leave us under a wrong impression; for although, as a whole, continental areas have been permanent, yet in detail they have been subject to wonderful and repeated changes. "Every square mile of their surface has been again and again under water, sometimes a few hundred feet deep--sometimes, perhaps, several thousand. Lakes and inland seas have been formed and been filled up with sediment, and been subsequently raised into hills, or even mountains. Arms of the sea have existed, crossing the continent in various directions, and thus completely isolating the divided portions for varying intervals. Seas have become changed into deserts and deserts into seas."

It has been shown beyond all question that North-western Europe owes its present mild climate to the influence of the Gulf Stream. Ocean currents, then, are a most important element in determining the climate of a country. If we would take the case of our hypothetical polar continent again, and, instead of presenting a continuous coast line, imagine it penetrated by long straits and fiords, possessing numerous bays, large inland seas, and in general allowing a free communication with the

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ocean, we are very sure the effect would be widely different.

Under these circumstances, says Mr. Geikie, the "much wider extent of sea being exposed to the blaze of the tropical sun, the temperature of the ocean in equatorial regions would rise above what it is at present. This warm water, sweeping in broad currents, would enter the polar fiords and seas, and everywhere, beating the air, would cause warm, moist winds to blow athwart the land to a much greater extent than they do at present; and these winds thus distributing warmth and moisture, might render even the high latitude of North Greenland habitable by civilized man." So we see that it is necessary to look for such geographical changes as will interfere with the movements of marine currents.

Now, it is easy to see that comparatively small geographical changes would not only greatly interfere with these currents, but might even cause them to entirely change their course. An elevation of the northern part of North America, no greater in amount than is supposed to have taken place at the commencement of the Glacial Age, would bring the wide area of the banks of Newfoundland far above the water, causing the American coast to stretch out in an immense curve to a point

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more than six hundred miles east of Halifax, and this would divert much of the Gulf Stream straight across to the coast of Spain.

Such an elevation certainly took place, and if continued westward, Behring's Strait would also have been closed. It is to such northern elevations, shutting out the warm ocean currents, that a great many geologists look for a sufficient explanation of the glacial cold.

Prof. Dana says: "Increase in the extent and height of high latitude lands may well stand as one cause of the Glacial Age." Then he points out how the rising of the land of Northern Canada and adjacent territory, which almost certainly took place, "all a sequel to the majestic uplift of the Tertiary, would have made a glacial period for North America, whatever the position of the ecliptic, or whatever the eccentricity of the earth's orbit, though more readily, of course, if other circumstances favored it."

It may occur to some that if high northern lands be all that is necessary for a period of cold, we ought to have had it in the Miocene Age, when there was a continuous land connection between

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the lands of high polar areas and both Europe and America, since we know that an abundant vegetation spread from there, as a center, to both these countries. But at that epoch circumstances were different. The great North Temperate lands were in a "comparatively fragmentary and insular condition." There were great inland seas in both Europe and Asia, through which powerful currents would have flowed from the Indian Ocean to Arctic regions.

Somewhat similar conditions prevailed in North America. The western part was in an insular condition. A great sea extended over this part of the country, joining the Arctic probably on the north, through which heated water would pour into the polar sea. And so, instead of a Glacial Age, we find evidence of a mild and genial climate, with an abundant vegetation.

We thus see that there are two theories as to the cause of the Glacial Age presented for our consideration. Both of them have received the sanction of scholars eminent for their scientific attainments. On inspection we see they are not antagonistic theories. They may both be true for that matter, and all would admit that whatever effect they would produce singly would be

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greatly enhanced if acting together. Indeed, there are very good reasons for supposing both must have acted in unison.

There seem to be very good reasons for not believing that the eccentricity of the earth's orbit, acting alone, produced the glacial cold. If that were the case, then whenever the eccentricity was great we should have a Glacial Age. Now, at some period of time during the long-extended Tertiary Age we are certain the eccentricity of the earth's orbit became very great, much more so, in fact, than that which is supposed to have produced the cold of the Quaternary Age. But we are equally certain there was no glacial epoch during this age.
What other explanation can we give for its non-appearance except that geographical conditions were not favorable?

But, on the other hand, there are certain features connected with the phenomena of the Glacial Age that seem very difficult of explanation, if we suppose that geographical changes alone produced them. We must remember that evidences of the former presence of glaciers are found widely scattered over the earth. We shall, therefore, have to assume an elevation not only for America and Europe, but extend it over into Asia, and take in the Lebanon Mountains, for they also show distinct traces of

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glaciers. And this movement of elevation must also have affected the Southern Hemisphere, the evidence being equally plain that at the same comparatively late date glaciers crushed over Southern Africa and South America. This is seen to prove too much. Again, how can we explain the fact that some time during the Glacial Age we had a submergence, the land standing several hundred feet lower than now, but still remained covered with ice, and over the submerged part there sailed icebergs and ice-rafts, freighted with their usual *debris*? That such was the state of things in Europe we are assured by some very good authorities.

Neither do geographical causes afford an adequate explanation of those changes of temperature that surely took place during the Glacial Age. These last considerations show us how difficult it is to believe that geographical causes could have produced the Glacial Age.

We are assured that all through the geological ages the continents had been increasing in size and compactness, and that just at the close of the Tertiary Age they received a considerable addition of land to the north. The astronomer also informs us that at a comparatively recent epoch the eccentricity

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of the earth's orbit became very great. The conditions being favorable, it is not strange that a Glacial Age supervened.

We have been to considerable length in thus explaining the position of the scientific world in regard to the cause of the Glacial Age. Our reason for so doing is that this age is, we think, so connected with the Paleolithic Age of man, that it seems advisable to have a clear understanding in regard to it. What we have to say is neither new nor original. It is simply an earnest endeavor to represent clearly the conclusions of some of our best scholars on this subject, and we have tried to give to each theory its due weight. Our conclusions may be wrong, but, if so, we have the consolation of erring in very good company.

We have now gone over the ground and are ready to see what dates can be given. Though the numbers we use seem to be very large indeed, they are so only in comparison with our brief span of life. They are insignificant as compared with the extent of time that has surely rolled by since life appeared on the globe. Let us, therefore, not be dismayed at the figures the astronomer sets before us.

About two hundred and fifty thousand years ago the earth's path

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around the sun was much the same as that of the present. No great changes in climate were liable to take place at that time. During the next fifty thousand years the eccentricity steadily increased. Towards the end of that time all that was necessary to produce a glacial epoch in the Northern Hemisphere was favorable geographical causes, and that our earth should reach its point nearest the sun in Summer. This it must have done when about half that time had elapsed.

We can in imagination see what a slow deterioration of climate took place. Thousands of years would come and go before the change would be decisive. But a time must have at length arrived when the vegetation covering the ground was such as was suited only for high northern latitudes. The animals suited for warm and temperate regions must have wandered farther south; others from the north had arrived to take their place. We can see how well this agrees with the changes of climate at the close of the Pliocene Age. The snows of the commencing Glacial Age would soon begin to fall, finally the sun would not melt them off of the high lands, and mountain peaks, and so a Glacial Age would be ushered in.

We have referred to the fact that the earth reaches its

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perihelion point a little earlier each year, and, as a consequence, we would have periods of mild climate alternating the cold. This extended period of time, equal to twenty-one thousand of our ordinary years, has been named the Great Year of our globe. Mr. Wallace has pointed out some very good reasons for thinking Mr. Croll's theory must be modified on this point. He thinks that when once a Glacial Age was fairly fastened on a hemisphere, it would retain its grasp as long as the eccentricity remained high, but whenever the Summer of the Great Year came to that hemisphere, it would melt back the glacial ice for some distance, but this area would be recovered by the ice when the Winter of the Great Year supervened. These effects would be different when the eccentricity itself became low. Then we would expect the glacial conditions to vanish entirely when the Summer of a Great Year comes on.

As we have made the theoretical part of this chapter already too long, we must hurry on. We can only say that this view is founded on the fact that when a country was covered with snow and ice, it had so to speak, a great amount of cold stored up in it, so much, in fact, that it would not be removed by the sun of a new geological Summer. This ought to be acceptable to such geologists as are willing to admit the advance and retreat of

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the great glacier, but yet doubt the fact of the interglacial mild climate.

But now to return to the question of time about two hundred and twenty thousand years ago. Then the Northern Hemisphere, according to this theory, was in the grasp of a Glacial Age. According to Mr. Wallace, as long as the eccentricity remained high, there could be no great amelioration of climate, except along the southern border of the ice sheet, which might, for causes named, vary some distance during the Great Year. Two hundred thousand years ago the eccentricity, then very high, reached a turning point. It then steadily, though gradually, diminished for fifty thousand years; at that time the eccentricity was so small, though considerably larger than at present, that it is doubtful if it was of any service in producing a change of climate. At that time, also, the Northern Hemisphere was passing through the Summer season of the Great Year. We ought, therefore, to have had a mild interglacial season. Except in high northern latitudes the ice should have disappeared. This change we would expect to find more marked in Europe than in America.

We need only recall how strong are the evidences on this point.

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Nearly all European writers admit at least one such mild interval, and though not wanting evidence of such a period in America, our geologists are much less confident of its occurrence.

But from that point the eccentricity again increased. So when the long flight of years again brought secular Winter to the Northern Hemisphere, the glaciers would speedily appear, and as eccentricity was again high, they would again hold the country in their grasp. Fifty thousand years later, or one hundred thousand years ago, it passed its turning point again; eighty thousand years ago, it became so small that it probably ceased to effect the climate. Since then it has not been very large. Twenty-five thousand years ago it was less than it is now, but it is again growing smaller. According to this theory, then, the Glacial Age commenced about two hundred and twenty thousand years ago. It continued, with one interruption of mild climate, for one hundred and forty thousand years, and finally passed away eighty thousand years ago.

What shall we say to these results? If true, what a wonderful antiquity is here unfolded for the human race, and what a wonderful lapse of time is included in what is known as the

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Paleolithic Age! How strikingly does it impress upon our minds the slow development of man! Is such an antiquity for man in itself absurd? We know no reason for such a conclusion. Our most eminent scholars nowhere set a limit to the time of man's first appearance. It is true, many of them do not think the evidence strong enough to affirm such an antiquity, but there are no bounds given beyond which we may not pass.

Without investigation some might reject the idea that man could have lived on the earth one hundred thousand years in a state of Savagism. If endowed with the attributes of humanity, it may seem to them that he would long before that time have achieved civilization. Such persons do not consider the lowliness of his first condition and the extreme slowness with which progress must have gone forward. On this point the geologists and the sociologists agree. Says Mr. Geikie: "The time which has elapsed from the close of the Paleolithic Age, even up to the present day, can not for a moment compare with the aeons during which the men of the old stone period occupied Europe." And on this subject Mr. Morgan says: "It is a conclusion of deep importance in ethnology that the experience of mankind in Savagery was longer in duration than all their subsequent experience, and that the period of Civilization covers but a fragment of the

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life of the race." The time itself, which seems to us so long, is but a brief space as compared with the ages nature has manifestly required to work out some of the results we see before us every day. We are sure, but few of our scholars think this too liberal an estimate. All endeavor to impress on our minds that the Glacial Age is an expression covering a very long period of time.

As to the time that has elapsed since the close of the Glacial Age there is some dispute, and it may be that we will be forced to the conclusion that the close of the Glacial Age was but a few thousand years ago. Mr. Wallace assures us, however, that the time mentioned agrees well "with physical evidence of the time that has elapsed since the cold has passed away."

Difficulties are, however, urged by other writers. We can see at once that as quick as the glaciers are removed the denuding forces of nature, which are constantly at work, would begin to rearrange the *debris* left behind on the surface, and in the course of a few thousand years must effect great changes. Now, in some cases the amount of such change is so small that geologists are reluctant to believe a vast lapse of time has occurred since the glaciers withdrew. Mr. Geikie tells us of

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some moraines in Scotland that they are so fresh and beautiful "that it is difficult to believe they can date back to a period so vastly removed as the Ice Age is believed to be." In our own country this same sort of evidence is brought forward, and we are given some special calculations going to show that the disappearance of the glaciers was a comparatively recent thing.

It will be seen that these conclusions are somewhat opposed to the results previously arrived at. In explanation Mr. Geikie thinks the cases spoken of in Scotland were not the moraines of the great glaciers, but of a local glacier of a far later date. He thinks that the climate, while not severe enough to produce the enormous glaciers of early times, was severe enough to produce local glaciers still in Scotland. It is possible that a similar explanation may be given for the evidence adduced in the United States. We can only state that, according to the difference in climate between the eastern and western sides of the Atlantic Ocean, when the climate was severe enough to produce local glaciers in Scotland, it would produce the same effect over a large part of eastern United States down to the latitude of New York City. And while it is true there would not be as much difference in climate on the two sides of the

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Atlantic in Glacial times as at present, since the Gulf Stream, on which such difference depends would then have less force, still it was not entirely lacking, and the difference must have been considerable.

Prof. Hitchcock has made a suggestion that whereas we know a period of several months elapses after the sun crosses the equator before Summer fairly comes on, so it is but reasonable to suppose that a proportionate length of time would go by after the eccentricity of the earth's orbit became small, before the Glacial Age would really pass away. He accordingly suggests it may have been only about forty thousand years since the glaciers disappeared.

At the close of the Glacial Age Paleolithic man vanished from Europe. This, therefore, brings us to the conclusion of our researches into what is probably the most mysterious chapter of man's existence on the earth.

It may not come amiss to briefly notice the main points thus far made in our investigation of the past. As to the epoch of man's first appearance, we found he could not be expected to appear until all the animals lower than he had made their appearance.

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This is so because the Creator of all has apparently chosen that method of procedure in the development of life on the globe. According to our present knowledge, man might have been living in the Miocene Age, and with a higher degree of probability in the Pliocene. But we can not say that the evidence adduced in favor of his existence at these early times is satisfactory to the majority of our best thinkers. All agree that he was living in Europe at the close of the Glacial Age, and we think the evidence sufficient to show that he preceded the glaciers, and that as a rude savage he lived in Europe throughout the long extended portion of time known as the Glacial Age.

We also found evidence of either two distinct races of men inhabiting Europe in the Paleolithic Age, or else tribes of the same race, widely different in time and in culture. The one people known as the men of the River Drift apparently invaded Europe from Asia, along with the species of temperate animals now living there. This people seem to have been widely scattered over the earth. The race has probably vanished away, though certain Australian tribes may be descendants of them. They were doubtless very low in the scale of humanity, having apparently never reached a higher state than that of Lower Savagism. The second race of men inhabiting Europe during the Paleolithic Age

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were the Cave-dwellers. They seem to have been allied to the Eskimos of the North. They were evidently further advanced than the Drift men, but were still savages.

The Paleolithic Age in Europe seems to have terminated with the Glacial Age. But we are not to suppose it came to an end all over the earth at that time. On the contrary, some tribes of men never passed beyond that stage. When the light of civilization fell upon them they were still in the culture of the old Stone Age. We are to notice that in such cases the tribes thus discovered were very low in the scale. The probable data for the Paleolithic Age have formed the subject of this chapter. While claiming in support of them the opinions of some eminent scholars, we freely admit that it is not a settled question, but open to very grave objections, especially the date of the close of the Glacial Age, which seems to have been comparatively recent, at least in America. We think, however, that these objections will yet be harmonized with the general results. Neither is this claimed to be an exhaustive presentation of the matter. It is an outline only--the better to enable us to understand the mystery connected with the data of Paleolithic man.

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In these few chapters we have been dealing with people, manners, arid times, of which the world fifty years ago was ignorant. Many little discoveries, at first apparently disconnected, are suddenly brought into new relation, and behold, ages ago, when the great continents were but just completed, races of men, with the stamp of humanity upon them, are seen filling the earth. With them were many great animals long since passed away. The age of animals was at an end. That of man had just begun.

The child requires the schooling of adversity and trial to make a complete man of himself, and it is even so with races of men. Who can doubt that struggling up from dense ignorance, contending against adverse circumstances, compelled to wage war against fierce animals, sustaining life in the midst of the low temperature which had loaded the Northern Hemisphere with snow and ice, had much to do in developing those qualities which rendered civilization possible.

As to the antiquity of man disclosed in these chapters, the only question that need concern us is whether it is true or not. Evidence tending to prove its substantial accuracy should be as acceptable as that disproving it. No great principle is here at stake. The truth of Divine Revelation is in no wise concerned.

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There is nothing in its truth or falsity which should in any way affect man's belief in an overruling Providence, or in an immortality beyond the grave, or which should render any less desirable a life of purity and honor. On the contrary, we think one of the greatest causes of thanksgiving mortals have is the possession of intellectual powers, which enable us to here and there catch a glimpse of the greatness of God's universe, which the astronomer at times unfolds to us; or, to dimly comprehend the flight of time since "The Beginning," which the geologist finds necessary to account for the stupendous results wrought by slow-acting causes.

It seems to us eminently fitting that God should place man here, granting to him a capacity for improvement, but bestowing on him no gift or accomplishment, which by exertion and experience he could acquire; for labor is, and ever has been, the price of material good. So we see how necessary it is that a very extended time be given us to account for man's present advancement. Supposing an angel of light was to come to the aid of our feeble understanding, and unroll before us the pages of the past, a past of which, with all our endeavors, we as yet know but little. Can we doubt that, from such a review, we would arise with higher ideas of man's worth? Our sense of the depths

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from which he has ascended is equated only by our appreciation of the future opening before him. Individually we shall soon have passed away. Our nation may disappear. But we believe our race has yet but fairly started in its line of progress; time only is wanted. We can but think that that view which limits man to an existence extending over but a few thousand years of the past, is a belittling one. Rather let us think of him as existing from a past separated from us by these many thousand years; winning his present position by the exercise of God-given powers.

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(1) The manuscript of this chapter was submitted to Prof. G. F. Wright, of Oberlin, for criticism.

(2) Wallace's "Island Life," p. 113.

(3) Nordenskiold's "American Journal of Science," vol. 110, p. 58.

(4) Wright's "Studies in Science and Religion," p. 307, where a map of this moraine is given.

(5) There is, however, a small area in the south-west part of Wisconsin where, for some reason, the ice passed by.

(6) Dane's "Manual of Geology," p. 538.

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(7) Wright's "Studies in Science and Religion," p. 308.

(8) "Men of the Drift," p. 71.

(9) Geikie's "Great Ice Age," p. 93.

(10) "Men of the River Drift."

(11) Abbott's "Primitive Industry," p. 545; Quoted from "Geology of Minnesota." Report, 1877, p. 37.

(12) Geikie's "Great Ice Age," p. 97.

(13) The astronomical theory, which we will first examine, was first enunciated by Mr. Croll, following a suggestion of the astronomer Adhemer. Mr. Croll's views were set forth in many able papers, and finally gathered into a volume entitled "Climate and Time in their Geological Relation." The ablest defense of these views is that by Mr. James Geikie, in his works "The Great Ice Age," and "Prehistoric Europe."

(14) Geikie's "Great Ice Age," p. 114.

(15) Lubbock's "Prehistoric Times," p. 420, Table 4.

(16) Ibid., Table 5.

(17) Geikie's "Great Ice Age," p. 123.

(18) Wallace's "Island Life," p. 143.

(19) Ibid., p. 124.

(20) "Geology of New Hampshire," Vol. II, p. 5.

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(22) Geikie's "Great Ice Age," p. 103.

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(23) Wallace's "Island Life," p. 149. Hitchcock's "Geology of New Hampshire," Vol. II, p. 7, gives a map showing what immense areas in that section would be raised to the surface by a raise of three hundred feet.

(24) *American Journal of Science*, 1871, p. 329.

(25) Wallace's "Island Life," p. 184.

(26) Wallace's "Island Life," p. 182.

(27) Ibid., p. 157 and note. Prof. Wright thinks this statement doubtful. He refers to the date of the Glacial Age in the Southern Hemisphere.

(28) Wallace's "Island Life," p. 200; Dawkins's "Early Man in Britain," p. 119; Geikie's "Great Ice Age," p. 256; Quatrefages's "Human Species," p. 288.

(29) For these results, see McFarland's Calculations in "American Journal of Science," 1880, p. 105.

(30) "Island Life," p. 153.

(31) See chart, p. 124, Wallace's "Island Life."

(32) "Ancient Society," p. 39.

(33) "Island Life," p. 201.

(34) "Prehistoric Europe," p. 312.

(35) On this point consult Wright's "Studies in Science and Religion," pp. 232~347; also Prof. Lewis in "Primitive Industry," pp. 547-551.

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(36) "Prehistoric Europe," p. 560.

(37) See any isothermal map.

(38) Wallace's "Island Life," p. 154, note.

(39) "Geology of New Hampshire," Vol. III, p. 327, referred to in Wright's "Studies in Science and Religion," p. 327.

END OF CHAPTER V.**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Processed by D.R. Thompson

drthom@ihug.co.nz

Chapter VI

THE NEOLITHIC AGE IN EUROPE.

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Close of the first cycle--Neolithic culture connected with the present--No links between the two ages--Long lapse of time between the two ages--Swiss lake villages--This form of villages widely scattered--Irish cranogs--Fortified villages--Implements and weapons of Neolithic times--Possessed of pottery--Neolithic agriculture--Possessed of domestic animals--Danish shell-heaps--Importance of flint--The art of navigation--Neolithic clothing--Their modes of burial--The question of race--Possible remnants--Connection with the Turanian race--Arrival of the Celts.

In the preceding chapters we have sought to learn what we could of the Paleolithic Age. We have seen what strange people and animals occupied the land, and have caught some glimpses of a past that has been recovered to us out of the very night of time. From under the ashes of Vesuvius archaeologists have brought to light an ancient city. We gaze on it with great interest, for we there see illustrated the state of society two thousand years ago. But other cities of that time are still in existence, and not only by the aid of tradition and song, but from the pages of history, we can learn of the civilization of the Roman people at the time of the destruction of Pompei; so that, in this case, our knowledge of the past is not confined to

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one source of information. But no voice of history or tradition, or of existing institutions, speaks to us of the Paleolithic Age. Of that remote time, the morning time of human life, we learn only from the labors of geologists and archaeologists. We are virtually dealing with a past geological age. The long term of years thus defined drew to its close amidst scenes of almost Arctic sterility. In all probability, glaciers reflected the sun's rays from all the considerable hills and mountains of Central and Northern Europe, though forming, perhaps, but a remnant of the great glaciers of the Ice Age. The neighboring seas must have been whitened by the glistening sails of numerous icebergs. Such was the closing scene of Paleolithic life.

The first great cycle of human life, as far as we know it now, was concluded in Europe. We do not mean to say that it terminated all over the world. In other regions it survived to far later times. But, in Europe, Paleolithic animals and men had worked out their mission, and we have now to record the arrival and spread of a new race, bringing with them domestic animals, a knowledge of rude husbandry, and many simple arts and industries of which their Paleolithic predecessors were ignorant.

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We recall, that the men of the Paleolithic Age seemed incapable of advancement; or their progress was so slow that we scarcely notice it. But we can trace the lines of advancement from the Neolithic culture to that of the present. We have, however, to deal with people and times far removed from the light of history.

We have before us, then, a new culture and a new people. On the one hand is Paleolithic man, with his rude stone implements, merely chipped into shape--surrounded by many animals which have since vanished from the theater of life--inhabiting a country which, at its close at least, was more like Greenland of to-day than England or France. The scene completely changes, when the misty curtain of the past again rises and allows us to continue our investigations into primitive times.

We would naturally expect to find everywhere, connecting links between these two ages--the culture of the one gradually changing into the culture of the other. This, however, is not the case. The line of demarkation between the ages is everywhere plainly drawn; and, furthermore, we are learning that a very long time elapsed between the departure, or disappearance, of the Paleolithic tribes, and the arrival of their Neolithic

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successors. This is shown in a great many ways, and we will notice some of them. We learn that Neolithic man occasionally used caves as a place of habitation. In such cases there is nearly always a thick layer of stalagmite between the strata containing the Paleolithic implements and the Neolithic strata --though this stalagmite is unmistakable evidence of the lapse of many years, we can not determine how many, as we do not know the rate of formation.

This lapse of time is shown very plainly when we come to consider the changes wrought in the surface features of the country by the action of running water. We know that rain, running water, and frost, constituting what we call denuding forces, are constantly at work changing the surface of a country. We know that, in general, this change is slow. But great changes have been wrought between these two ages.

In the British Islands, we know that the rivers had time to very materially change the surface features of the land. The important rivers of Scotland had carved out channels one hundred feet deep in places; and along their courses, especially near their mouths, had plowed out and removed great quantities of glacial material--forming broad flats which became densely

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wooded before Neolithic man made his appearance on the scene. In some cases the entire surface of the land had been removed, leaving only knolls and hills of the old land surface. Examples of this occur on the east coast of England, and in what is known as the Fen-lands. The final retreat of the glaciers must have left the country covered with *debris*. After this had been largely denuded, the country became densely wooded. It was not until these changes had taken place, that Neolithic man wandered into Europe.

But still another ground exists for claiming a long interval between these two ages, namely, the great changes that took place in the animal world of Europe during these two epochs. Many different species of animals characteristic of the Paleolithic Age vanished as completely from Europe as the rude tribes that hunted them, before the appearance of Neolithic tribes. But little change in the fauna of England has taken place in the last two thousand years. So it is obvious that the great change above-mentioned demands many centuries for its accomplishment. Huge animals of the elephant kind, such as the mammoth, no longer crashed through the underbrush, or wallowed in the lakes. The roars of lions and tigers, that haunted the caves of early Europe, were no longer heard. In short, there

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had disappeared forever from Europe the distinctly southern animals that diversified the fauna of Paleolithic times. Even the Arctic animals were banished to northern latitudes, or mountain heights.

We have dwelt to some length on the proofs of a long-extended time between these two ages. The more we reflect on these instances the more impressed are we with a sense of duration vast and profound, in which the great forests and grassy plains of Europe supported herds of wild animals all unvexed by the presence of man. We will only mention one more point and then pass on.

We have seen that the highest rank we can assign to Paleolithic man in the scale of civilization is Upper Savagism. But when Neolithic man appeared, he was in the middle status of Barbarism. The time, therefore, between the disappearance of Paleolithic man and the arrival of Neolithic man was long enough to enable primitive man to pass one entire ethnical period, that of Lower Barbarism. But this requires a very long period of time, probably several times as long as the entire series of years since Civilization first appeared, which is supposed to be in the neighborhood of five thousand years ago.

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We must now turn our attention to Neolithic man himself and learn what we can of his culture, and discover, if possible, what race it was that spread over Europe after it had been for so long a time an uninhabitable country. A few remarks by way of introduction will not be considered amiss.

We are learning that tribal organization, implying communism in living, is characteristic of prehistoric people. Tribal organization sufficed to advance man to the very confines of civilization. We have no doubt but that this was the state of society amongst the Neolithic people. But this implies living in communities or villages. We need not picture to ourselves a country dotted with houses, the abodes of single families; such did not exist, but here and there were fortified villages.

Still another consequence follows from this tribal state of society. There was no such thing as a strong central government. Each tribe obeyed its own chief, and a state of war nearly always existed between different tribes. Such we know was the state of things among the Indian tribes of America. Travelers tell us that it is so to-day in Africa. Each tribe stood ready to defend itself or to make war on its neighbors.

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One great point, therefore, in constructing a village, was to secure a place that could be easily defended.

Bearing these principles in mind, let us see what we can learn of their habitations. Owing to a protracted drouth, the water in the Swiss lakes was unusually low in the Winter of 1854, and the inhabitants of Meilen, on the Lake Zurich, took advantage of this state of affairs to throw up embankments some distance out from the old shore, and thus gain a strip of land along the coast. In carrying out this design, they found in the mud at the bottom of the lake a number of piles, some thrown down and others upright, fragments of rough pottery, bone and stone instruments, and various other relics.

Dr. Keller, president of the Zurich Antiquarian Society, was apprised of this discovery, and proceeded at once to examine the collection made and the place of discovery. He was not long in determining the prehistoric nature of the relics, and the true intent of the pile remains. He proved them to be supports for platforms, on which were erected rude dwellings, the platforms being above the surface of the water, and at some distance from the shore, with which they were connected by a narrow bridge.

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Illustration of Lake Village, Switzerland.----------

This was the first of a series of many interesting discoveries from which we have learned many facts as to Neolithic, times. The out we have introduced is an ideal restoration of one of these Swiss lake villages. It needs but a glance to show how admirably placed it was for purposes of defense. Unless an enemy was provided with boats, the only way of approach was over the bridge. But the very fact that they resorted to lakes, where at the expense of great labor they erected their villages, is a striking illustration of the insecurity of the times.

This discovery once made, it is surprising what numbers of these ancient lake villages have been discovered. Switzerland abounds in large and small lakes, and in former times they must have been still more numerous, but in the course of years they have become filled up, and now exist only as peat bogs. But we now know that during the Neolithic Age the country was quite thickly inhabited, and these lakes were the sites of villages. Over two hundred have been found in Switzerland alone. Fishermen had known of the existence of these piles long before their meaning

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was understood. Lake Geneva is one of the most famous of the Swiss lakes. Though in the main it is deep, yet around the shore there is a fringe of shallow water.

It was in this shallow belt that the villages were built.
The sites of twenty-four settlements are known. We are told that on "calm days, when the surface of the water is unruffled, the piles are plainly visible. Few of them now project more than two feet from the bottom, eaten away by the incessant action of the water. Lying among them are objects of bone, horn, pottery, and frequently even of bronze. So fresh are they, and so unaltered, they look as if they were only things of yesterday, and it seems hard to believe that they can have remained there for centuries."

A lake settlement represents an immense amount of work for a people destitute of metallic tools. After settling on the locality, the first step would be to obtain the timbers.
The piles were generally composed of the trunks of small-sized trees at that time flourishing in Switzerland. But to cut down a tree with a stone hatchet is no slight undertaking.
They probably used fire to help them. After the tree was felled it had to be cut off again at the right length, the branches

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lopped off, and one end rudely sharpened. It was then taken to the place and driven into the mud of the lake bottom. For this purpose they used heavy wooden mallets. It has been estimated that one of the settlements on Lake Constance required forty thousand piles in its construction.

The platform which rested on these piles was elevated several feet above the surface of the water, so as to allow for the swash of the waves. It was composed of branches and trunks of trees banded together, the whole covered with clay. Sometimes they split the trees with wedges so as to make thick slabs. In some instances wooden pegs were used to fasten portions of the platform to the pilework.

As to the houses which were erected on these platforms, though they have utterly vanished, yet from a few remains we can judge something as to the mode of construction. They seem to have been formed of trunks of trees placed upright, one by the side of the other, and bound together by interwoven branches. This was then covered on both sides with two or three inches of clay. A plaster of clay and gravel formed the floor, and a few slabs of sandstone did duty for a fire-place. The roof was of bark, straw, or rushes. There does not seem to have been much of a

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plan used in laying out a settlement. As population increased other piles were added, and thus the village gradually extended. No one village would be likely to contain a great number of inhabitants. Calculations based on the area of one of the largest settlements in Lake Geneva, gives as a result a population of thirteen hundred, but manifestly nothing definite is known.

This brief description gives us an idea of a method of constructing villages which, as we shall soon see, extended all over Europe, though varied somewhat in detail. The condition of the remains indicate that these settlements were often destroyed by fire. At such times quantities of arms, implements, and household industries would have been lost in the water, and so preserved for our inspection.

This mode of building found such favor among the early inhabitants of Europe that it continued in use through the Neolithic Age, that of Bronze, and even into the age of Iron. Passages here and there in ancient histories evidently refer to them. Though they have long since passed away in Switzerland, the Spaniards found them in Mexico, and they are still to be seen in some of the isles of the Pacific. Remembering this, we

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need not be surprised if we find in one small lake settlements belonging to widely different ages. Here one of the Stone Age, there one of the Bronze, or even a confused mingling of what seems to be several ages in one settlement.

There is scarcely a country in Europe that does not contain examples of lake villages. From their wide distribution we infer that a common race spread over the land. We will now mention some differences in construction discovered at some places, where, from the rocky nature of the bed of the lake, it was impossible to drive piles so as to form a firm foundation. They sometimes packed quantities of stone around the piles to serve as supports in a manner as here indicated. "In all probability the stones used were conveyed to the required spot by means of canoes, made of hollowed out trunks of trees. Several of these canoes may still be seen at the bottom of Lake Bienne, and one, indeed, laden with pebbles, which leads us to think it must have foundered with its cargo."

Illustration of Foundation, Lake Village.----------

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In some cases these heaps of stone and sticks rise to the surface of the water or even above it, the piles in such cases serving more to hold the mass together than as a support to the platform on which the huts were erected. This mode of construction could only be employed in small lakes. This makes in reality an artificial island, and seems to have been the favorite method of procedure in the British Islands. In Ireland and Scotland immense numbers of these structures are known. They are called crannogs. This cut represents a section of one in Ireland. Though they date back to the Neolithic Age, yet they so exactly meet the wants of a rude people that they were occupied down to historic times.

Illustration of Irish Crannog.----------

The advantage of forming settlements where they could only be approached on one side were so great that other places than lakes were resorted to. Peat-bogs furnished nearly as secure a place of retreat as do lakes. These have been well studied in Northern Italy. They do not present many new features. They were constructed like the lake villages, only they were surrounded by

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a marsh, and not by a lake. In some of the Irish bogs they first covered the surface of the bog with a layer of hazel bushes, and that by a layer of sand, and thus secured a firm surface.
In this case the villages were still further defended by a breastwork of rough spars, about five feet high. One of the houses of this group was found still in position, though it had been completely buried in peat. No metal had been used in its construction. The timbers had been cut with a stone ax, and the explorer was even so fortunate as to find an ax, which exactly fitted many of the cuts observed on the timbers.

But we are not to suppose that lakes and bogs afforded the only sites of villages. They are found scattered all over the surface of the country, and, as we shall soon see, they show the same painstaking care to secure strong, easily defended positions. They have been generally spoken of as forts, to which the inhabitants resorted only in times of danger. We think, however, they were locations of villages, the customary places of abode. For this is in strict accordance with what we find to be the early condition of savage life in every part of the world.

Traces of these settlements on the main-land have been mostly obliterated by the cultivation of the soil during the many years

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that have elapsed since their Neolithic founders occupied them. In Switzerland the location of five of these villages are known. In all instances they occupied places very difficult of approach --generally precipitous sides on all but one or two. On the accessible sides ramparts defended them. The relics obtained are in all respects similar to those from the lake villages.

Illustration of Fortified Camp, Cissbury.----------

Fortified inclosures have been described in Belgium. We are told, "They are generally established on points overhanging valleys, on a mass of rocks forming a kind of headland, which is united to the rest of the country by a narrow neck of land. A wide ditch was dug across this narrow tongue of land, and the whole camp was surrounded by a thick wall of stone, simply piled one upon another, without either mortar or cement." "One of these walls, when described, was ten feet thick, and the same in height." These intrenched positions were so well chosen that most of them continued to be occupied during the ages which followed." The Romans occasionally utilized them for their camps. Over the whole inclosure of these ancient camps worked

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flints and remains of pottery have been found.
These fortified places have been well studied in the south of England.

What is known as the South-Downs in Sussex is a range of hills of a general height of seven hundred feet. This section is about five miles wide and fifty miles long. Four rivers flow through these downs to the sea. In olden times their lower courses must have been deep inlets of the sea, thus dividing those hills into five groups, each separated from the other by a wide extent of water and marsh land. To the north of these hills was a vast expanse of densely wooded country. It is not strange, then, to find traces of numerous settlements among these hills. As the surface soil is very thin, old embankments can still be traced.
The cut given is a representation of Cissbury, one of the largest of these camps. It incloses nearly sixty acres.
The rampart varies according to the slope of the hill. Where the ascent was at all easy it was made double. Fortified camps are very numerous throughout the hill country. They vary, of course, in size, but the situation was always well chosen.

As for the buildings themselves, or huts of the Neolithic people, we know but little. They were probably built much the

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same as the houses in the lake settlements. We meet with some strange modifications in England. Frequently within these ramparts we find circular pits or depressions in the ground. They are regarded as vestiges of habitations, and they must have been mainly under ground. "They occur singly and in groups, and are carried down to a depth of from seven to ten feet through the superficial gravel into the chalk, each pit, or cluster of pits, having a circular shaft for an entrance. At the bottom they vary from five to seven feet in diameter, and gradually narrow to two and a half or three feet in diameter in the upper part. The floors were of chalk, sometimes raised in the center, and the roof had been formed of interlaced sticks, coated with clay imperfectly burned."

In the north of Scotland, instead of putting them under ground, they built them on the natural surface, and then built a mound over them all. In appearance this was scarcely distinguishable from a mound, but on digging in we discover a series of large chambers, built generally with stones of considerable size, and converging toward the center, where an opening appears to have been left for light and ventilation. In some instances the mound was omitted, and we have simply a cluster of joining huts, with dry, thick walls. These have been appropriately named

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"Bee-hive Houses."

We can form a very good idea of Neolithic Europe from what we have learned as to their habitations. A well-wooded country, abounding in lakes and marshes, quite thickly settled, but by a savage people, divided into many tribes, independent of and hostile to each other. The lakes were fringed with their peculiar settlements; they are to be noticed in the marshes, and on commanding heights are still others. The people were largely hunters and fishers, but, as we shall soon see, they practised a rude husbandry and had a few domestic animals. Such was the condition of Europe long before the Greek and Latin tribes lit the beacon fires of civilization in the south.

It is evident that the builders of the lake settlements and the fortified villages were an intelligent and industrious people, though their scale in civilization was yet low. Their various implements of bone, horn, and stone display considerable advance over the rude articles of the Drift.

Illustration of Neolithic Axes.----------

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One of the most important implements was the ax. The Paleolithic hatchet, we remember, was rude, massive, and only roughly chipped into shape, and was intended to be held in the hand. The Neolithic ax was a much better made one, and was furnished with a handle. They were enabled to accomplish a great deal with such axes. "Before it, aided by fire, the trees of the forest fell to make room for the tiller of the ground, and by its sharp edge wood became useful for the manufacture of various articles and implements indispensable for the advancement of mankind in culture." These axes vary in size and finish.
As a general thing they are ground to a sharp, smooth edge, but not always, nor were they always furnished with a handle.

Some axes are found with a hole bored in them, through which to pass a handle. These perforated axes are found in considerable numbers, and some have denied that they could be produced without the aid of metal. It is almost self-evident that the perforated axes are later in date than the solid ones, and probably many of them are no earlier in time than the Age of Metals. There is, however, nothing to show that all belong to so late a time. Besides, experiments have amply shown that even the hardest kind of flint can be drilled without the aid

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of metals.

Warlike implements are, of course, quite common. Many of the axes found are probably war axes. Then besides we have arrowheads, spears, and daggers. These are considered to be "marvels of skill in flint chipping." Stone was used for a great many other purposes, such as scrapers, sling-stones, hammers, saws, and so on. Flint was generally the kind of stone used. Our civilization owes a great deal to this variety of stone. It is not only hard, but its cleavage is such that it was of the greatest use to primitive man. In a general way the Neolithic stone implements are seen to be better adapted to the object in view than the Paleolithic specimens. They are also generally polished.

Wood was largely used in their common household implements. But it is only in exceptional cases that it has been preserved to us. They have been recovered, however, in peat-bogs and in the remains of lake settlements. These wooden utensils consist of bowls, ladles, knives, tubs, etc. They used fire to hollow them out, and the blows of the flint hatchet used to remove the charred portions, are still to be observed in some specimens.

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Illustration of Neolithic Weapons.----------

The Neolithic people had learned how to manufacture pottery, though not of a very superior quality. It is all hand-made: so the potter's wheel had not yet been introduced. The material is clay mixed with gravel or pounded shells. Very often they ornamented their clay vessels with lines and dots. The bowls or jars were evidently suspended by cords, for the bottom was made too rounding for them to stand erect. Besides, we find the holes for the cords, and in some places handles.

Illustrations of Ax in Sheath, and Hafted Hatchet in Sheath.--

No notice of Neolithic tools would be complete without mentioning the use made of horn and bone. One peculiar use for which they employed horn was as a socket for holding other implements. Thus this figure shows us an ax in a socket of horn. The middle of the socket is generally perforated with a round or oval hole, intended to receive a handle of oak, birch, or some

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other kind of wood adapted for such a use. The cut below represents a hatchet of this kind. A number of these sockets have been found, which were provided at the end opposite to the stone hatchet with a strong and pointed tooth. These are boars' tusks, firmly buried in the stag's horn. These instruments, therefore, fulfilled double purposes: they cut or crushed with one end and pierced with the other. Sockets are also found which are not only provided with the boars' tusks, but are hollowed out at each end, so as to hold two flint hatchets at once, as is seen in our next figure. Chisels and gouges were also sometimes placed in bone handles. Portions of horn probably at times did duty as hoes. We give a representation of such an implement. We must now seek some information as to how the men of the Neolithic Age supported life.

Illustration of Sheath, with two Hatchets.---------

Illustrations of Chisels in Sheath, and Horn Hoe.---------

From the remains of fish at all the lake settlements it is evident they formed no inconsiderable portion of their food.

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Fishing nets and hooks have been discovered. They were successful hunters as well. But the men of this age were no longer dependent on the chase for a livelihood. We have mentioned several times that they were acquainted with agriculture. This implies a great advance over the primitive hunters of the early Stone Age.

On the shores of the lakes which furnished them with a place of habitation they raised many of our present species of grain. Owing to a cause of which we have already spoken--that is, destruction of the lake settlements by fire--the carbonized remains of these cereals have been preserved to us. There were four varieties of wheat raised, none exactly like our common wheat. In addition to this they raised barley and millet, several varieties of each. Nor were the fruits neglected. Apples and pears were dried and laid away for use in the Winter. Seeds of the common berries were found in abundance, showing that these primitive people were fully alive to their value.

From this it follows that the Neolithic people were not only tillers of the soil, but horticulturists as well. According to Dr. Keller, the vegetable kingdom furnished their principal supply of food. Hazelnuts, beechnuts, and chestnuts were found

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in such quantities as to show they had been gathered for use. Neither hemp, oats, nor rye were known. Not only do we find the remains of the grains, fruits, seeds, etc., from which the above conclusions are drawn, but, farther than this, pieces of bread have been found in a carbonized state, and thus as effectually preserved as the bread of a far later date found in the ovens of Pompeii. According to Figuier, the peasant classes of Tuscany now bake bread, after merely bruising the grain, by pouring the batter on glowing stones and then covering it with ashes. As this ancient prehistoric bread is of similar shape, it was probably baked in an equally primitive fashion.

Aside from the natural interest we feel in these evidences as to ancient industry, a study of the remains of plants cultivated by the Neolithic people reveals to us two curious and suggestive facts. It has been found that the wild plants then growing in Switzerland are in all respects like the wild plants now growing there. But the cultivated plants--wheat, millet, etc.--differ from all existing varieties, and invariably have smaller seeds or fruits. This shows us that man has evidently been able to effect considerable change by cultivation, in the common grains, during the course of the many centuries which separate the Neolithic times from our own age. But if this rate of change be

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adopted as a measure of time, what shall we say is to the antiquity demanded to explain the origin of cultivated grain from the wild grasses of their first form?

We learn, in the second place, that the cultivated plants are all immigrants from the south-east--their native home being in South-eastern Europe and Asia Minor. We shall afterward see that this is true of the domestic animals also. There can be but one explanation for this. The ancient inhabitants of Europe must have come from that direction, and brought with them the plants they had cultivated in their eastern homes, and the animals they had reduced to their service. The traces of agriculture thus found in Switzerland are by no means confined to that country. In other countries of Europe, such as England and France, we also find proofs that men cultivated the earth. In localities where we do not find the grain itself, we find their rude mills, or mealing stones, which as plainly indicate a knowledge of the agricultural art as the presence of the cereals themselves.

As we have stated, Neolithic man in Europe possessed domestic animals. He was not only a cultivator of the soil, but he was a herdsman as well; and he kept herds of oxen, sheep, and goats. Droves of hogs fattened on the nuts of the forest, and the dog

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associated with man in keeping and protecting these domestic animals. We know that the Swiss Lake inhabitants built little stalls by the sides of their houses, in which they kept their cattle at night. But these domestic animals were not descendants of the wild animals that roamed the forests of Europe. Like the plants, they are immigrants from the south-east. Our best authorities consider they were brought into Europe by the invading Neolithic tribes.

The, knowledge of husbandry, though rude, and the possession of domestic animals, though of a few species only, strikingly indicate the advance over the Paleolithic tribes. They also had fixed places of living. This culture spread all over Europe. That it was substantially the same everywhere there is no doubt. Certain refuse heaps in Denmark, Scotland, and indeed in all the sea-coast countries, have been thought to support a different conclusion. Those of Denmark have been very carefully studied, and so we will refer to them. All along the Baltic coast, but especially in Denmark, have been discovered great numbers of mounds, which were found to consist "almost entirely of shells, especially of the oyster, broken bones of animals, remains of birds and fishes, and, lastly, some wrought flints." The first supposition in regard to those shell-heaps was that they were of

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marine formation, accumulated beneath the sea, and elevated to the surface along with the gradual rise of the land. But they are now known to be nothing more or less than the sites of ancient settlements. The location of the rude cabins can still be traced. The ancient hearths are still in place. "Tribes once existed here who subsisted on the products of hunting and fishing, and threw out around their cabins the remains of their meals, consisting especially of the *debris* of shell-fish." These heaps gradually accumulated around their rude dwellings, and now constitute the refuse heaps in question.

The careful investigation of their contents has failed to disclose any evidence of a knowledge of agriculture, and the only domestic animal found is the dog. The implements are altogether of stone and horn. No trace of metal has yet been obtained. As a rule, they are rudely made and finished. Though of the Neolithic type, they are not polished except in a few instances. The principal interest turns on the question of age of these refuse heaps. Some think they were accumulated at the very beginning of the Neolithic Age--that these tribes preceded by many years the men of the Swiss Lakes. Others think they were tribes of the same great people, living at the same time. On such a point as this, only those who have carefully

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studied the deposits are entitled to speak.

Some few facts stand out quite prominently. The size of the mounds indicate long-continued residence--showing that these people had permanent places of abode. As they are not confined to Denmark, but are found generally throughout Europe, it would seem to imply that the Neolithic people preferred to live as fishers and hunters wherever the surroundings were such that they could by these means obtain an abundant supply of food. Some shell-heaps in Scotland were still forming at the commencement of the Bronze Age; and Mr. Geikie, on geological grounds, assigns the shell-heaps of Denmark to a late epoch of the Stone Age.

It seems to us quite natural that isolated tribes, living where game was abundant, and where fishing met with a rich reward, should turn in disgust from the agricultural life of their brother tribes, and, resuming the life of mere hunters and fishers, speedily lose somewhat of their hardly won culture--for civilization is the product of labor. Whenever a people from necessity or choice abandon one form of labor for another demanding less skill to triumph over nature, a retrogression in culture is inevitable.

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From what we have stated as to the use of flint we can readily see that it was a valuable material. Sections where it was found in abundance would as certainly become thickly populated as the iron and gold regions of our own day. In Paleolithic times the supply of flint was mostly obtained from the surface and in the gravel of rivers. In Neolithic times men had learned to mine for flint. Flint occurs in nodules in the chalk. Near Brandon, England, was discovered a series of these workings. They consist of shafts connected together by galleries. These pits vary in size from twenty to sixty feet in diameter, and in some cases were as much as thirty feet deep. From the bottom of these shafts they would excavate as far as they dared to the sides. They made no use of timbers to support the roof, and so these side excavations were not of great extent. In these old workings the miners sometimes left behind them their tools. The principal one was a pick made of deer's horn, as is here represented. Besides these, they had chisels of bone and antler. The marks of stone hatchets on the sides of the gallery are visible.

Illustration of Miner's Pick.----------

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In one instance the roof had caved in, evidently during the night, and on clearing out the gallery near the end where the roof stood firm, there were found the implements of the workmen, just as they were left at the close of the day's work; and in one place on the pick, covered with chalk dust, was still to be seen the marks of the workman's hand. How many years, crowded with strange scenes, have swept over England since that chalky impression was made! The surface of the earth is a palimpsest, on which each stage of culture has been written over the faint, almost obliterated, records of the past. Not only the living man, who has left there the impression of his hand has passed away, but also his people and his culture. And now it is only here and there that we catch a faint tracing underlying our later civilization, by which we reconstruct the history of these far-away times.

Nothing would be more natural than that where flint was found in abundance a regular manufactory of implements would be established. Such was the case at Cissbury, which we have already mentioned as one of the early British towns. Mines had been dug within the walls inclosing the town. The surface of the ground near the old mines at this place is literally covered by

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splinters of flint in every stage of manufacture, "from the nodule of flint fresh out of the chalk, spoilt by an unlucky blow, to the article nearly finished and accidentally broken." Here the flint was mined and chipped into rudimentary shape, but carried away to be perfected and polished.

A very important place in Neolithic manufactures was noticed near Tours, France. Here was an abundant supply of flint, and very easily obtained, and the evidence is conclusive that here existed real manufactories. Of one stretch of ground, having an area of twelve or fourteen acres, we are told: "It is impossible to walk a single step without treading on some of these objects." Here we find "hatchets in all stages of manufacture, from the roughest attempt up to a perfectly polished weapon. We find, also, long flakes or flint-knives cleft off with a single blow with astonishing skill."

But in all these objects there is a defect; so it is concluded that these specimens were refuse thrown aside in the process of manufacture. As at Cissbury, very few polished flints are found, so we may conclude the majority of weapons were carried elsewhere for completion. But some weapons were completed here.

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In the neighborhood have been found the stones used as polishers. This cut shows us one used in polishing the axes. The workmen would take one of the rough-hewn instruments, and, rubbing it back and forth on such a stone as this, gradually produced a smooth surface and a sharpened edge.

Illustration of Polishing Stone.----------

We have suggested that our civilization owes a great deal to flint. If we will consider the surroundings of their manufacturing sites, we will see the force of this remark. It must have taxed to the utmost the powers of these primitive men to sink the shafts and run the galleries to secure a supply of this valuable stone. In short, they had to invent the art of quarrying and working mines. This would lead to the division of labor, for while one body of men would become experts as miners, others would become skillful in chipping out the implements, and still others would do the finishing and polishing. A system of barter or trade would also arise, for the workmen at the mines and factories would have to depend on others for food and clothing, and in payment for the same would furnish them

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implements. As localities where flint could be obtained in suitable quantities are but few, we can see how trade between widely scattered tribes would arise. This kind of traffic is shown to have extended over wide distances in Neolithic times. For instance, there was been found scattered over Europe axes made of varieties of stone known as nephrite and jade. They were highly valued by primitive tribes, being very hard and of a beautiful green color. They are thought to have been employed in the observance of superstitious rites. But quarries of these varieties of stone do not occur in Europe. An immense amount of labor has been expended in finding their native home. This is now known to be in Asia. Manufactured in Asia, axes of these materials may have drifted into Europe and finally arrived in England.

Illustration of Neolithic Boat-making.--------

Trade between different tribes must have been greatly facilitated by means of canoes, which Neolithic man knew well how to make. The art of navigation was probably well advanced. The canoes were formed of the trunks of large trees. In most

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cases they were hollowed out by means of the ax and fire combined. Sometimes the ends were partially rounded or pointed, but often cut nearly square across--rather a difficult shape to propel fast or to guide properly. These ancient boats have been found in nearly all the principal rivers of Europe, and in many cases, no doubt, come down to much later date than the Neolithic Age. From the remains of fish found in their refuse heaps we are confident that in some such a shaped boat as this they trusted themselves far out at sea. They served to transport them from the shores of Europe to England, and at a later date to Ireland.

Illustration of Neolithic Cloth.----------

The clothing of the men of the Neolithic Age doubtless consisted largely of the prepared skins of the animals, and some fragments of leather have been found in the lake settlements. But a very important step in advance was the invention of spinning and weaving, both of which processes were known at this time. The cloth which is here represented "is formed of twists of interwoven flax, of rough workmanship, it is true, but none the less remarkable, considering the epoch in which it was

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manufactured. Balls of thread and twine have also been found. This cut is a spindle-whorl. These have been discovered very often. They were made sometimes of stone and at other times of pottery and bone. The threads were made of flax, and the combs which were used for pushing the threads of the warp into the weft show that it was woven into linen on some kind of a loom. Several figures of the loom have been given, but we have no certainty of their correctness.

Illustrations of Spindle-whorl and Weaver's Comb.-------

Let us now see if we can gather anything as to the religious belief of Neolithic man. On this point we can at best only indulge in vague conjectures. Yet some light seems thrown on this difficult subject by examination of the burial mounds. This introduces us to a subject of much interest which, in our hurried review, we can but glance at.

Scattered over Europe are found numbers of mysterious monuments of the past. Some of them we have mentioned already as the embankments surrounding ancient villages. But aside from these

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are other monuments, such as burial mounds, rude dolmens, and great standing stones, sometimes arranged in circles, sometimes in rows, and sometimes standing singly. Many of these remains may be of a far later date than the Neolithic Age, still it is extremely difficult to draw a dividing line between the monuments of different ages.

Illustration of Chambered Burial Mound, Denmark.----

Illustration of Dolmen, England.----------

Burial mounds are found everywhere, many in Europe going back to the Neolithic Age, though some are of a very recent construction. The Egyptian Pyramids are burial mounds on the grandest scale. The first cut represents a Danish Tumulus, or burial mound, of this Age. The openings lead to the center of the mound, where they connect with chambers in which the bodies were formerly placed. There are, of course, various modifications of this tumulus. Often the gallery was omitted, a rude chamber was erected, and a mound reared over it. Sometimes, indeed, no chamber was made, but simply a mound

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placed over the body.

Illustration of Dolmen, France.----------

Illustration of Dolmen, once Covered with Earth.-----

There have been found in England a great many stones arranged as in the preceding cut, though generally not built with such regularity as is there represented. They are named Dolmens, a word meaning stone tables. They were more generally made of rough stones, rudely arranged. This cut represents one found in France. In early times these were supposed to have been rude altars used by the mysterious Druids in celebrating their rites. They are now known to be the tombs of the Neolithic Age. They are, in fact, the chambers above mentioned. The mound of earth has since disappeared and left its chamber standing exposed to the air. Traces of the old passage way are still met. Whether all Dolmens were once covered with earth or not, is not yet known. In the majority of cases they probably were. In the last cut portions of stone are still buried in the earth. We are told that in India the people in some places still erect Dolmens

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similar to those of Neolithic times.

Illustration of Menhir.----------

Illustration of Stone Circle, England.-------

Aside from the tombs themselves, there are other arrangements of great stones which must have once possessed great significance to their builders, but their meaning is now lost. Of this nature are the blocks of rough stone set up in the ground generally in the vicinity of tombs. These are the standing stones, or menhirs, which, as we have stated, are arranged in various forms. When arranged in circles, they are generally regarded as tombs. When placed in long parallel rows, as at Carnac, in France, we are not sure of their meaning. We are told that the Hill tribes of India to this day erect combinations of gigantic stones into all the shapes we have here described.

The peculiar shape of the burial mounds, with a passage way conducting us to an interior chamber, or series of chambers, probably arose from the belief entertained by many savage

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people, that the dead continue to live an existence much like that when alive, and consequently the same surroundings were deemed necessary for their comfort. So the tomb was made similar to the house of the living. The ordinary Winter huts of the Laplander are very similar in shape and size to the burial tumuli, and amongst some people, as the inhabitants of New Zealand, the house itself is made the grave. It was closed up and painted red, and afterward considered sacred.

Illustration of Chambered Tomb, France.--------

So it may quite well be that the Neolithic inhabitants of Denmark, "unable to imagine a future altogether different from the present, or a world quite unlike our own, showed their respect and affection for the dead by burying with them those things which in life they had valued most; with women, their ornaments, with warriors, their weapons. They buried the house with its owner, and the grave was literally the dwelling of the dead. When a great man died he was placed on his favorite seat, food and drink was arranged before him, his weapons were placed by his side, his house was closed, and the door covered up,

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sometimes, however, to be opened again when his wife or children joined him in the land of spirits."

That they believed in a life beyond the grave is shown by the objects they buried with the individuals. These are implements of various kinds, flakes, arrow-heads, scrapers, celts, and pottery, doubtless intended to be of service to the deceased. We know this to be a very common proceeding amongst all barbarous people. In some cases it would appear as if they realized that the material things themselves could be of no service to the departed, but imagined that in some vague way the spirits of things might be of service to the spirits of men, and so they would purposely break the flints and throw the fragments into the grave. Sometimes they may have buried only models of the objects they wished to give to the dead, imagining that in this way the spirits of the objects represented would accompany and be of service to the spirits of the departed. To this day the Eskimos bury small models of boats, spears, etc., rather than the objects themselves. The ancient Etruscans buried jewelry, but made it so thin and fragile that it could not have been of service to the living. In China this is carried still further, and paper cuttings or drawings of horses, money, etc., are burned at the grave.

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These remarks may explain the absence of remains so often noticed in Neolithic burials in England. But other evidence can be given to show this belief in future life. The mounds were of course often erected over noted chiefs, and we are not without evidence that he was not allowed to go unattended into the other world. It has been noted that often skeletons have been met with having the skull, cleft, and in one case, at least, all but one presented that appearance. It is but reasonable to suppose that these skeletons were those of captives or slaves sacrificed to be the attendants of the chief in the spirit world.

Funeral feasts were also held in honor of the dead. Thus we may gather from burial mounds something of the religious belief of their occupants.

It is not improbable that ancestor worship, or the worship of the dead, was part of their faith, so that the mounds became temples. On this point we are told "it is impossible not to believe then that the people who made these great, and in some cases elaborately constructed, tombs would continue ever after to regard them as in some sort consecrated to the great chiefs who were buried under them. Each tribe would have its own specially sacred tombs, and perhaps we may here see a germ of

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that ancestor-worship which may be traced in every variety of religions belief."

We now approach a difficult part of our inquiry, but, at the same time, one that possesses for us a great interest. Who were these people into whose culture we have been inquiring? While laying the foundation of our present civilization, though being the fountain head from whence many of the arts and industries, which now make our existence comfortable and happy, take their feeble origin, gradually developing and expanding as the time rolls on, have they themselves, as a race, vanished in the mighty past, or are their descendants still to be found in Europe? Who were they? Whence and when? Difficult problems, but we have read to but little purpose if we have not already learned that earnest observers need but the slightest clue to enable them to trace out brilliant results.

In the first place, are there any grounds for supposing the Neolithic people to be the descendants of those who hunted the reindeer along the Vezere? This view has its supporters. M. Quatrefages, a very able scholar indeed, maintains that the Neolithic people were the same race as those who inhabited the caves and found shelter in the rock grottoes of France.

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This, to others, does not seem credible. We must recall the long lapse of time that it is apparent has elapsed between the two ages. We have seen how different were the two cultures; as Mr. Geikie remarks, "So great, indeed, is the difference between the conditions of life that obtained in the two ages of Stone, that we can hardly doubt that the two people came of different stocks." The Neolithic people brought with them domestic animals and plants whose native home is in Western Asia. We can hardly account for this fact, if we suppose them to be the descendants of Paleolithic tribes in France.

Abandoning, therefore, any attempt to trace lines of connection between the people of the two ages, let us carefully study all the facts connected with the Neolithic people and their culture, to see if we can solve the problem by so doing. We have noticed that substantially the same stage of culture existed throughout Europe from Switzerland to the British Islands. This points to the presence of a common race during at least a portion of the time. But if there was a common race living in Europe they would certainly possess common physical features. As a race they may have been tall in stature, or medium, or short, and portions of the human skeleton would show a uniformity in this regard.

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Now one of the means that scientists use to determine the races of men is a comparison of skulls, measured in a systematic manner. The objection has been made that no reliance can be placed on these results, because at the present day skulls of all sorts of shapes and sizes can be obtained among people of the same nationality. But these objections would not apply to people of prehistoric times. Their surroundings would be simple and natural--not artificial and complex, as in modern times. In our times people of different nationality are constantly coming in contact, and intermarriage results; but in prehistoric times this was not liable to occur, and so the comparative purity of blood would certainly produce a much greater uniformity of physical features.

From a very careful examination of a great number of burial mounds in Great Britain, it has been ascertained that in all of those that date back to Neolithic times, and contain portions of human skeletons, the bones are always those of individuals small in stature, the average height being about five and a half feet. The skulls are of that variety known as long skulls. From this we can at once form a mental picture of the Neolithic inhabitants of Britain. No less important conclusions have been deduced from the study of burial mounds on the continent.

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We meet with remains of these same small-sized people. "They have left traces of their presence in numerous interments in chambered tombs and caves in Belgium and France, as well as in Spain and Gibraltar. We may therefore conclude that at one period in the Neolithic Age the population of Europe, west of the Rhine and north of the Alps, was uniform in physique and consisted of the same small people as the Neolithic inhabitants of Britain and Ireland."

We must now inquire whether there are any people living in Europe which might have descended from the original stock. We are in the position of those who, from a few broken down arches, a ruined tower and dismantled wall, would seek to form a mental picture of the stately building that once stood there. If we can here and there discover, by the light of history or exploration, some races or tribes that, owing to their geographical position, have escaped the fate that befell the great body of their countrymen, we may perhaps replace our mental picture by one founded on reality. Nor need we be in doubt where to seek for such scattered remnants of people. Successful invaders always appropriate to their own use the fertile lowlands and the fruitful portions of the country of their helpless foes. But a weak people have often, in the rocky

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fastnesses of their land, made a successful stand. So, to determine the race, we will examine the people living in such regions, and see if there are any that physically conform to what is already known of the Neolithic people, and so entitled to claim a relationship by descent.

Both slopes of Pyrenees Mountains, between France and Spain, have been occupied from time immemorial by a peculiar race of people known as the Basque. Secure in their mountain homes, they have resisted foreign civilization, and retained their national characteristics as well as their liberties, though they have been nominally vassals to many powers, from the early Carthaginians to the later French and Spanish. From the many invasions they have undergone the Basque language and people are by no meals uniform. But Dr. Broca, one of the most learned anthropologists in Europe, has shown that the original Basques were dark in complexion, with black hair and eyes. In addition to this, the efforts of some of the most eminent scholars in Europe, who have made numerous examinations of skulls and skeletons obtained from ancient Basque cemeteries, have conclusively shown that in all physical features the Basques agree with men of Neolithic times.

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The Basques do not belong to the great division of the human family known as Aryans, to which the English-speaking races, as well as the nations of Europe generally, belong. They belong to a far older division of the human family--the Turanian--and were doubtless in possession of Europe long before the Indo-European nations commenced their westward migrations from Central Asia. They are described as being brave, industrious, and frugal, with patriarchal manners and habits. They scorn authority, except what emanates from themselves, and have but few nobility. They are impetuous, merry, and hospitable, fond of music and dancing. Of their warfare we are told they are "not distinguished in open warfare, but unconquerable in guerrilla warfare, and famed for defense of walled cities." Such are the Basques of to-day, and many of these traits of character, we doubt not, were the same amongst the Neolithic people.

Mr. Dawkins also thinks that two tribes, living in Northern Italy, in the very earliest historical times, are other remnants of the same people. One of these were the Ligurians. Investigations and traditions show that some time before the dawn of history they had been driven out of the pleasant parts of Southern France, but had made a successful stand in the

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mountain regions of Northern Italy. They, like the Basques, were strong, active, and warlike. They were small in stature, swarthy in features, and long-headed. To the south of these were the Etruscans. But little is known of them, though the evidence is that long before the Christian Era they were a powerful people. In physical features they resembled those already described. Their sculpture exhibits only short, sturdy figures, with large heads and thick arms. Another possible remnant of these people existed at the very dawn of history in the mountainous regions of Wales. They were known as Silures. but have since become absorbed in the surrounding population. In civilization and physical features they agree with the remnants already described.

In the north of Russia are found the Finns. Their origin and migrations are alike unknown. One thing is certain, they belong to the Turanian family, and so are probably allied to the Basques and Etruscans. It is possible that they also are but a sorry remnant of the once wide-spread Neolithic people. Driven out of the fairer portions of Europe, they hive found an asylum in their present bleak surroundings. Like the people already described, they are short in stature, and dark visaged.

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The tribes we have thus briefly mentioned are regarded by some as representatives of the Neolithic people. Prof. Winchell, speaking of the wide-spread extension of the Turanian race, assures us, that "history, tradition, linguistics, and ethnology conspire to fortify the conclusions that, in prehistoric times, all Europe was overspread by the Mongoloid (Turanian) race, of which remnants have survived to our own times in the persons of the Basques, Finns, Esths, Lapps, and some smaller tribes." Researches into the surroundings of these people, combined with what we have already learned as to the culture, customs, and manners of the Neolithic people in the preceding pages, throw no little light on this age. The darkness of oblivion seems dispelled by the light of science, and we behold before us the Europe of Neolithic times, thickly inhabited by a race of people, small in stature, dark visaged, and oval-faced--fond of war and the chase, yet having a rude system of agriculture. The picture seems complete; and we have now only to raise some inquiries as to the great stock of people to which they belonged, and conjecture as to the date of their arrival in Europe.

We are now learning that far back in the past, when mankind was

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yet young in the world, the great Turanian family held a commanding position. They seem to have dispersed widely over the earth. Their migrations began long before that of the Aryan and Semitic people. When tribes of these later people began their wanderings, they found a Turanian people inhabiting the country wherever they went. Long before the times of Abraham, the fertile plains of Chaldea were the home of powerful tribes of this family. Egypt, and the fertile Nile Valley, the home of ancient civilization, was their possession at a time long preceding the rise of the Pharaohs. Their Asiatic origin is corroborated by what we have learned of their domestic animals and cereals, which we know to be also from Asia, or the south-east. These Turanian tribes, at some far remote time, must have appeared in Asia Minor. Urged onward by the pressure of increasing population, they passed into Europe and Northern Africa. Their progress was, doubtless, slow; but they gradually filled Europe. The English Channel must have presented no inconsiderable barrier, and it was after Europe had been populated for a long time that they ventured to brave its passage in their rude canoes.

The Neolithic culture, which we have treated of in reference to Europe only, is seen to have been of Turanian origin. From its

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Asiatic home it spread over the entire world--to the islands of the Pacific, and even America. The road that leads from barbarism to civilization is long and difficult, and it is not strange that but one or two families of men were able to attain that end by their own unaided effort. The Turanian Family, which probably advanced man from savagism into barbarism, seems to have at that stage exhausted its energies. This is but an illustration of the fact that a race, like an individual, has a period of growth, a maturity of healthful powers, and an old age of slow decadence. After thus dispersing over the world, carrying with them the culture of the Neolithic Age, they seem to have halted in their progress. It remained for a new people, starting, perhaps, from the same state of culture, but with new energies, to discover and employ metals in the construction of tools and implements. This gave them so great a command over nature that civilization became possible. But whatever considerable advance the Turanian races were able to make beyond the Neolithic culture was by reason of intercourse with these later people. Where completely isolated from them, as in the New World, they remained, for the most part, in the Neolithic culture.

We have hitherto spoken as if there was but one race in Europe

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during Neolithic times. In the main this is true; yet, near the close of this time, a different race arrived in Europe.

That this is so, is proved by the same line of evidence used to determine the Neolithic people. We shall have much to say of them hereafter. They were the vanguard of the great Aryan race.

This calls for some explanation. It has been found that the principal languages of Europe and South-western Asia have certain common characteristics; so much so that we are justified, even compelled, to assume that the nations speaking these languages, such for instance as the Teutonic, Sclavic, Italic, Greek, Persian, Hindoostanee, and others, are descendants from a common ancestor. These people are called, collectively, Aryans. They were the ones who drove the Turanians out of the fairest portions of Europe. Though they appeared at a late date, they have filled the most important places in history, and the civilization of the world to-day is Aryan.

Now we must again form a mental picture of Neolithic Europe--after it had been for a long time in the possession of the Turanian tribes, the first band of Aryan invaders make their appearance. They must have appeared somewhere near the south-eastern confines of Europe, but they pressed forward to the western portion. They firmly seated themselves in the western

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and central parts of Europe, driving out the Turanian tribes who had so long possessed the land. They were themselves still in the Neolithic stage of culture. But they probably did not long antedate the knowledge of metals. Mr. Dawkins thinks that it caught up with them before they arrived in Britain, and that they are the ones who introduced bronze into that island. The Aryan tribe, who thus made their appearance in Europe, are identified as the Celts of history.

The Neolithic Age thus drew to its close, but not all at once. It disappeared first in the southern portion of Europe--from Greece and Italy; but it lingered to a far later date in the north: among the scattered tribes of Turanian people it would still assert its sway. Even after metals were introduced, the cheapness and abundance of stone would cause it to be used, among the poorer people at least. But finally this culture gives way to a higher one in Europe--though it still survived in portions of Asia, the Isles of the Pacific, and in America. We can but reflect on the difference between the two ages of stone. The former ends amidst Arctic scenes--and, in the darkness that ensues, ages pass before we again detect the presence of man. The Neolithic closes gradually, everywhere giving way to a higher culture. We must not forget that our

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present civilization owes much to our far away Neolithic ancestors. When we reflect on the difficulties that had to be overcome before animals could be profitably held in a domestic state, or cultivation of the earth made profitable, we almost wonder that they succeeded in either direction. Aside from these, we turn to them for the origin of trade, navigation, and mining. No inconsiderable part of the battle of civilization had thus been won.

REFERENCES

(1) The manuscript of this chapter was submitted to Prof. Chas. Rau, of the Smithsonian Institution, for criticism.

(2) The Cave-men were, undoubtedly, considerably in advance of the Men of the Drift. If we regard the two as but one race of men, then the statement is not true. We have, however, given our reasons for considering the Cave-men as a different race. Hence the statement made above.

(3) Consult Geikie's "Prehistoric Europe," chapters on "British Post-glacial and Recent Deposits."

(4) Lions still lived in Greece at the time of Herodotus. See "Polymnia," vii, 125, etc.

(5) This last argument is drawn from Mr. Morgan's work. It is

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well to state that his divisions are very far from being accepted by all authorities.

(6) Morgan's "Ancient Society."

(7) Lubbock's "Prehistoric Times," p. 189.

(8) Figuier's "Primitive Man," p. 223.

(9) On lake settlements, consult Keller's "Lake Dwellings;" Rau's "Early Man in Europe," chap. v; Sir John Lubbock's "Prehistoric Times," chap. vi; Figuier's "Primitive Man," p. 218, *et seq*.

(10) Figuier's "Primitive Man," p. 222.

(11) Dawkins's "Early Man in Britain," p. 270.

(12) Keller's "Lake Dwellings." Translated by Lee.

(13) Figuier's "Primitive Man," p. 153.

(14) General Lane Fox's "Hill Forts of Sussex," Archaeology, vol. xvii.

(15) Dawkins's "Early Man in Britain," p. 267.

(16) Lubbock's "Prehistoric Times," p. 56.

(17) Mr. Dawkins's "Early Man in Britain," p. 274.

(18) Smithsonian Report, 1868.

(19) Lubbock's "Prehistoric Times," p. 103.

(20) Figuier's "Primitive Man," pp. 161-166.

(21) "Primitive Man," p. 171.

(22) Lubbock's "Prehistoric Times," p. 219.

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(23) Dawkins's "Early Man in Britain," p. 268.

(24) These heaps are generally called "kjokken-moddings"--meaning kitchen refuse.

(25) One mound is spoken of as being one thousand feet long, two to three hundred feet wide, and ten feet high.

(26) On Danish Shell Mounds, consult Keary's "Dawn of History," p. 369, *et seq.*; Lubbock's "Prehistoric Times," chap. vii; Geikie's "Prehistoric Europe," pp. 365-9; Figuier's "Primitive Man," pp. 129-134; Rau's "Early Man in Europe," pp. 108-113; Dawkins's "Early Man in Britain," pp. 309-305.

(27) Dawkins's "Early Man in Britain," p. 279.

(28) Figuier's "Primitive Man," pp. 147-150 and 154: Another very important place was the Island of Rugen, in the Baltic Sea. Rau's "Early Man in Europe," p. 137.

(29) "Proceedings American Antiq. Society, April, 1881," p. 286.

(30) Figuier's "Primitive Man," p. 262.

(31) See remarks of Prof. Rau on this subject ("Early Man in Europe," pp. 128-9 and note.) Mr. Dawkins thinks it "probable also that the art of weaving woolen cloth was known, although, from its perishable nature, no trace of it has been handed down to us." ("Early Man in Britain," p. 275.)

(32) Lubbock's "Prehistoric Times," p. 132.

(33) Lubbock's "Prehistoric Times," p. 130.

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(34) On this subject consult Lubbock's "Prehistoric Times," chap. v.; Keary's "Dawn of History," p. 363-6; Geikie's "Prehistoric Europe," p. 375; Dawkins's "Early Man in Britain," p. 284-9; Ferguson's "Rude Stone Monuments;" Figuier's "Primitive Man," chap. iii.; Rau's "Early Man in Europe," p. 139; "Archaeology," Vol. XLII.

(35) "Human Species", p. 335.

(36) "Prehistoric Europe," p. 547.

(37) Dawkins's "Early Man in Britain," p. 310, note 3.

(38) Ibid., p. 314.

(39) Thurman, Virchow, Huxley, and others.

(40) Mr. Dawkins is inclined to view them as a remnant of the Neolithic people. Whether our scholars will ultimately accept his views, remains to be seen.

(41) Brace's "Races of the Old World," p. 82,

(42) Am. Encyclopedia, Art. Basque.

(43) Brace's "Races of the Old World," p. 82.

(44) Brace's "Races of the Old World," p. 82.

(45) "Pre-Adamites," p. 150.

(46) It is unnecessary to caution the reader, that, after all, our knowledge of "prehistory" is vague. Prof. Virchow, who is eminent authority on these points, thinks it not yet possible to identify the prehistoric people of Europe; and good authorities

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hold that the Turanian tribes just named are the remnants of Paleolithic tribes, instead of Neolithic.

(47) Morgan's "Ancient Society," p. 39.

(48) The exceptions to this statement are the higher classes of sedentary Indians, of which we shall treat in future pages.

END OF CHAPTER VI.**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Processed by D.R. Thompson

drthom@ihug.co.nz

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Chapter VII

THE BRONZE AGE IN EUROPE.

Races of Men, like Individuals--Gradual change of Neolithic Age to that of Bronze--The Aryan family--First Aryans Neolithic--Origin of Bronze--How Great discoveries are made--Gold the first metal--Copper Abundant--No Copper Age--The discovery of Tin--Explanation of an Alloy--Bronze, wherever found, the same Composition--What is meant by the Bronze Age--Knowledge in other Directions--Gradual Growth of Culture--Three Centers of Bronze Production--Habitations during the Bronze Age--The Bronze Ax--Implements of Bronze--Personal ornaments--Ornaments not always made of Bronze--Advance in Arts of living--Advance in Agriculture--Warlike Weapons--How they worked Bronze--Advance in Government--Trade in the Bronze Age--Religion of the Bronze Age --Symbolical figures--Temples of the Bronze Age--Stonehenge.

It is with races of men as with individuals, the progressive

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growth of youth soon reaches its limit and maturity of power. While it brings greater strength, it has not the buoyancy of early years, so the manner of life becomes fixed, and onward progress stops. They can then only hope to hold on the even tenor of their way, happy if increasing years do not bring again their childhood state. The Neolithic people entered Europe early in the youth of the race which spread their civilization over the globe, but the race to which they belonged appear to have reached their zenith of development long ages ago, since which time, whatever higher culture they have reached has been a gift to them by other people. Their energies became exhausted, and for a long series of years Europe was filled by the camps, lake villages and fortified places of Neolithic times.

As to the absolute length of time during which they inhabited Europe, we have no data to determine. Relatively, their sojourn, however long, was but a short time compared to the duration of the old Stone Age. It presents no such evidence of lapse of ages as can be observed in the older deposits, yet we may be sure that it was for no inconsiderable period.

The Paleolithic Age was apparently terminated in Europe by the cold of the last glacial epoch. No such natural course put an

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end to the Neolithic Age, but as the strong have an advantage over the weak, the young over the old, so does a race young, undeveloped, or in the early maturity of its powers, have an advantage over the older and more fixed civilization with which it comes in contact. To understand the causes which introduced into Europe the Bronze Age, we must refer to the Aryan race and to Asia.

We have in the preceding chapter briefly mentioned the Aryan race. They have so much to do with the higher culture of the Metallic Ages, that it seems not out of place to refer once more to their origin. The evidence goes to show that the ancient Aryans inhabited some portion of South-western Asia. As a race or family, they appear to have been one of the latest developed. Yet a record of their progress is a record of civilization.

Unless we reflect, we are liable to be misled by the expression, recent development. The Hindoos, one of the latest members of this family, were in India several thousand years before Christ. But however far back we trace them, we find them in possession of metals. Aside from this, we know that before the different Aryan tribes had commenced their migration (with the exception, however, of the Celts), while they formed but one

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mass of people, they worked some of the metals. They could have acquired this knowledge only after the passage of many years, when they were ignorant of it. This bespeaks a profound antiquity for the Aryan family.

As we have seen, Europe, while yet inhabited by Neolithic people, was invaded by a branch of the Aryans. We do not know the date of this invasion, yet it must have been an early date, since the Celts separated from the Aryans before the use of metals. The Aryans have ever been noted as an aggressive people, and under different names have, in modern times, carried victorious arms in all quarters of the globe. This is equally characteristic of the primitive Aryans. Though it is not apparent that they possessed any higher culture than the people who already inhabited Europe, yet they everywhere triumphed over them and possessed themselves of the fairest portion of the Neolithic domain, driving the primitive inhabitants to those mountainous regions where their descendants are found to-day.

It is not probable that the Aryan invaders waged exterminating war against the Neolithic tribes. The evidence shows that there was considerable mingling of the two races. It has been suggested, however, that the Neolithic people who were not

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driven away were reduced to slavery. However that may be, the remains of the two people are found side by side in chambered tombs and sepulchral caverns, showing that they dwelt together in the same area. As before remarked, the Aryan invaders are identified as the Celts. That it was relatively late in the Neolithic Age when they made their appearance, is shown by the fact that they had only reached the English Channel when a knowledge of bronze caught up with them.

We must now endeavor to learn the origin of bronze. The impulsive energies of this newer race found vent not only in conquest over the neighboring tribes, but it is extremely probable that they are the ones who first compelled nature to yield up her metallic stores to be of service to man. If the knowledge of fire was the starting point of human advancement, surely the knowledge of metals, their useful properties, and how to extract them from their ores, may lay claim to being the starting point of our present enlightenment. We have but to glance around us to see how many of our daily comforts are dependent on the use of metals. Should we, by any mischance, become deprived of the use of iron, or of the useful alloys, bronze and brass, our civilization would be in great danger of reverting to Savagism. Man, destitute of metals, can do but

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little to improve his surroundings; but grant him these, and victory over his environment is secured.

We can not retrace the exact steps of this beautiful discovery; we are not sure to what family it is to be ascribed. Perhaps not to any one alone. Nature may have taken her children by the hand, and kindly guided their feeble steps in the line of experiments leading up to this knowledge, and, finally, one family, more fortunate than the others, succeeded in the attempt. All great discoveries have been approached in different directions, by different people. No sooner is it made than this fact appears, and people widely separated by time and place are found to be on the verge of the same great truth. It was probably so at the discovery of metallurgy.

The Turanian tribes, who had so long inhabited Europe, were suddenly confronted by the victorious hosts of the Celts, the vanguard of the Aryans, the precursors of a higher culture. The movements of these primitive people could not fail to have a great effect on the human mind. It would become alert, keen, and active. Such was the state of ancient society when a knowledge of bronze was introduced--a discovery which consigned stone, hitherto the substance most commonly made use of to advance

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human interests, to a subordinate position, and opened up for man the exhaustless mineral stores of nature.

It is suggested by some that gold was the first metallic substance employed. Its glittering particles would attract the attention of primitive man, and little articles of ornament were early manufactured from it. To be sure, the supply was very limited; but what there was would serve the useful purpose of imparting to men some idea of metallic substances. Portions of it falling in the fire might have suggested the idea of smelting and of molding--might, at least, have lead to experiments in that line. The supply of gold existing in a native state is so small, that no use could have been made of it except for ornaments.

Iron, we know, is the most abundant mineral. But it is very rare in a native state, and its ores have nothing distinguishing about them, and so it is not strange that another metal received the attention of primitive man. That metal was probably copper. It is often found in a pure state in nature. In the Michigan mines of our own country, masses of pure copper many tons in weight have been discovered. No such rich deposits are found in the Old World; but considerable quantities of native copper

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were obtained, and it was by no means a rare metal.
Copper possesses several qualities that would attract attention.
It is quite malleable; that is, it can be easily hammered into
shape. We can imagine the surprise of the old stone-workers at
finding a stone that, instead of breaking or splitting, could be
hammered into shape. By accident, or otherwise it would be
learned, in time, that it could be melted. This would lead to
the idea of molding.

If the above process were followed out, there would be a real
Copper Age preceding that of Bronze: no trace of such an age has
yet been detected in Europe. "But there is, however, every
reason for believing, that, in some parts of the world, the use
of native copper must have continued for a lengthened period
before it was discovered that the addition of a small portion of
tin not only rendered it more fusible, but added to its
elasticity and hardness." The absence of a Copper Age in
Europe would imply that the art of manufacturing bronze was
discovered in some other locality.

Copper by itself is so soft that it would not be of much use to
man, except the experience they would gain of melting and
molding. In our own country the aboriginal inhabitants were well

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acquainted with copper, and even knew how to mold it. Yet, except as just pointed out, it is not probable that it exerted any marked influence on their development. In the old world supplies of native copper are limited, and recourse must be had to the ores of copper. Now these ores, such as copper-pyrites, are nearly always of a bright color, and as such would attract the attention of primitive man. They might suspect that these bright colored ores contained copper from finding similarly colored ores in connection with native copper, in fact passing from one form to the other. But it requires no little skill to reduce the ores of copper; and, when obtained, for reasons just pointed out, it would not be of great utility. But primitive man was thus cautiously and experimentally feeling his way to a knowledge of metallurgy.

All the evidence obtainable goes to show that tin was known as early as copper, or at least soon after. Its ores though not striking on account of their color, are on account of their great weight. It is comparatively easy to reduce it from its ores. It is quite widely distributed over the earth. It often occurs in the gravels of rivers, where, as we have already mentioned, primitive men must have, at a very early date, sought for gold. Owing to their weight, the gravel of tin-stone would

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remain behind with the gold when it was washed. "In process of time its real nature might have been revealed by accident; and, before the eye of the astonished beholder, the dull stone, flung into the fire, became transfigured into the glittering metal."

When two metals come together in a molten state, they often form, not a mixture of the two, part copper and part tin, for example, but a new compound, different from either, called an alloy. Copper is, so to speak, a sociable metal, and readily unites with many different metals--amongst others with tin, when it forms bronze, the article that marks a new state in the history of primitive culture. It seems to us strange that an alloy, a combination of two different metals, should have been the first used by man, and not a simple metal like iron. Such, however, is the fact of the case; and we have tried to point out the probable steps which led up to the invention of bronze. We can scarcely comprehend the difficulties which attended the labors of the primitive metal-workers. There were no books containing the wisdom of many, from which the investigator could draw his stores of knowledge. and the only way that knowledge could be disseminated was by word of mouth.

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Now, when one man makes an important step in a discovery, hundreds of earnest workers, some, perhaps, in distant places, are quickly made aware of the fact, and extend its scope, or point out its imperfections, and thus hasten on the desired end. Then, each individual, or community, must, of necessity, have commenced at the beginning, and the discoveries made would hardly be perpetuated in the memory of others. There were so many obstacles to be overcome before a knowledge of bronze could be acquired, in the then existing state of human knowledge, that it must ever remain a source of wonder to us, at the present day, that it was invented at all.

We may picture to ourselves the ancient copper-worker, after numerous experiments, guided by some good genius, finally hitting on some process by which, from his mass of ore, he extracted a nearly pure piece of copper. Having learned how to reduce these ores, there are many ways in which it might have been found that a mixture of the two metals would form a new compound of greatly increased value.

It must have taken a long course of experiments to determine what proportions of each metal to use to make the best bronze. It is interesting to know that these early workers had learned

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the proportions of each to use, not varying a great deal from the results of modern research--that is, from ten to twelve per cent of tin. Bronze relics, no matter where obtained, whether in the Old or the New World, do not widely depart from this standard, and such instances as do would probably denote that the supply of tin became short. This uniformity of composition would imply that the art of making bronze was discovered in one place, from which it gradually spread over the globe.

This fact is a key to the culture of the Bronze Age. Widely separated communities, destitute of a knowledge of metals, would instinctively make use of stone. In this case uniformity of type would not imply community of knowledge. But a knowledge of metals is altogether different. It is wonder enough that one community should have hit on the invention of bronze. The chance would be against its independent discovery in widely separated areas. They would be more apt to chance on the production of some other metal. Thus; tribes in the interior of Africa are said to have passed direct from the Stone to the Iron Age, a knowledge of bronze not having been carried to them.

We are thus able to form a true conception of the Bronze Age. It did not prevail over the world at the same time. Indeed, as

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we shall subsequently see, there is every reason to suppose it spread very slowly, and that it still lingered in Central and Northern Europe long after its use had been abandoned for that of iron in the South. Neither, when it was first introduced, did it put a stop to the use of stone. It was necessarily costly, and on its first appearance in a country, brought hither by trade, could only be afforded by rich and powerful chiefs and warriors. As time advanced, and they learned to make it cheaper, and each country took up its separate manufacture, it would gradually supersede stone. But bronze was never cheap enough to drive out the use of stone altogether. This only occurred when the art of working iron was discovered.

We shall learn that the knowledge of bronze, while a very important and distinguishing phase of culture of the Bronze Age, was not its only characteristic. It was distinguished by the arrival and spread of the Aryan races, by a great extension of commerce, by more refinements in the comforts of life, by the increasing strength of government, which in after ages flowered out in the mighty nations of antiquity, and rendered historic, civilization possible.

Some facts stand out with great prominence. The origin of this

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culture is lost in the very night of time. We may be sure that it goes back to a profound antiquity, and that it extended over a long series of years.

It is evident there was no great and sudden change from the culture of the Stone Age to that of Bronze. It was as if the darkness of night had given place to the roseate light of dawn, to be shortly followed by the full day of historic times. It was probably introduced by trade. The articles introduced in this way would consist of simple implements, weapons, and ornaments. Following after the trade would be found the smelter with his tools, and, where the conditions were favorable, local manufactories would be set up. But this home industry would not prevent importation of more pretentious articles from abroad. This would account for the rich collections of shields, swords, and golden cups found in Denmark that betray an Etruscan origin.

Investigations of recent scholars show that the bronze of the early Bronze Age came from Asia Minor. Subsequently there were three great centers of bronze production, each having certain styles. These were the Russian on the east, the Scandinavian on the north, and the Mediterranean on the south. If this view be correct, bronze must have been in use in the South of Europe

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long before it was in the North. This view of the introduction of bronze is, we think, that of the best scholars in Europe. Others, however, think bronze was brought in by the invasion of the Aryan tribes. Mr. Keary says: "The men of the Bronze Age were a new race, sallying out of the east to dispossess the older inhabitants, and if, in some places, the Bronze men and the Stone men seem to have gone on for a time side by side, the general characteristic of the change is that of a sudden break." We have shown that it was carried to England by an invasion, and it was, perhaps, so introduced into Denmark, but in other countries of Europe by trade.

Let us now see what change in the home life, in the culture of the people, would be brought about by the use of bronze. We must reflect that we are not to deal with some new race, but with the same race that inhabited Europe at the close of Neolithic times. The people who had triumphed over nature with their implements of stone were now put in possession of weapons and implements of greatly increased efficiency. The results could not fail to advance their culture. We would not expect any great change in the houses. They would, however, be much better built. The metallic tools were certainly a long ways ahead of the best stone implements. With the aid of metallic axes, knives, saws,

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gouges, and chisels, their cabins could be increased in size and appearance. They still built settlements over the lakes, but the Bronze Age settlements were more substantially built, and placed farther out from shore. Fortified places were still numerous; the remains of thousands of them of this age have been found in Ireland. But the forests were cleared, wild animals disappeared, society became more settled, and we may be sure that an increasing number of little hamlets were scattered over the country.

Caves were resorted to during this epoch only in times of danger. One at Heathbury Burn, in England, contained portions of the skeletons of two individuals, surrounded by many articles of bronze and a mould for casting bronze axes. It is not difficult to read the story. In some time of sudden danger workers in bronze fled hither with their stores, but owing to some cause were unable to escape the death from which they were fleeing, and their bodies. with their mineral stores, were lost to sight until the modern explorer made them a subject of scientific speculations.

Illustration of Bronze Axes--First Form.----------

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The most important implement was the ax. Our civilization has originated from many small things. It is difficult to overestimate the importance of the ax in advancing civilization. The stone axes, easily blunted and broken, could have made but little impression on the vast forests of pine, oak, and beech, covering the greater part of Britain and the continent in the Neolithic Age. Clearings necessary for pasture and agriculture must unquestionably, then, have been produced principally by the aid of fire. Under the edge of the bronze ax clearings would be rapidly produced, pasture and arable land would begin to spread over the surface of the country; with the disappearance of the forests the wild animals would become scarce, hunting would cease to be so important, agriculture would improve, and a higher culture inevitably follow. "When first the sound of the woodman's ax was heard in the forests of the north, the victory of man over his natural environments was secured, and the forest and morass became his forever."

The bronze ax was used for a great variety of purposes, not only as an ax, but as chisel, hoe, etc. As might be expected, the oldest axes were simply modeled after the stone ones.

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The preceding cut represents these simple forms.

They were inserted into the handle much the same as they did the stone axes. It never occurred to these ancient workers to cast the axes with a hole in them for the handle.

Illustration of Bronze Axes--Second Form.------

Illustration of Bronze Axes--Third Form.--------

The above cut represents the second form of the ax. The trouble with the first was that much usage would inevitably split the handle. To remedy this, a stop or ridge was raised across the celt, and the metal and the wood were made to fit into one another. The small figure illustrates this method of hafting.
It would be quite natural to bend the sides of this second form around, and thus would arise a third form in which the handle was let into a socket, of which we also give a cut. As a general thing, bronze axes were plain, but they were sometimes ornamented with ridges, dots, and lines.

In addition to axes, they of course had many other implements of

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bronze. Chisels were made much the same as at present, except that the handle fitted into a socket. A few hammers have been discovered in the Swiss lake villages. Bronze knives of different styles and sizes were quite numerous. The workmanship on them is generally skillful. They were, as a rule, fitted into a handle of bone, horn, or wood, and the blade was nearly always carved. In some cases the knives also ended in a socket into which the handle fitted.

Illustrations of Chisel, Hammer and Bronze Knives.-------

In matters of personal ornament, the men and women of the Bronze Age were as willing to make use of artificial helps as their descendants to-day, and no doubt fashion was quite as arbitrary in her rule then as now. Among some savage nations the dressing of the hair--especially of the men--is carried to a very elaborate pitch. In this respect, some of the dandies of the Bronze Age certainly excelled. They evidently built up on their heads a great pyramid of hair; in some cases large enough to allow of the use of hair-pins two feet long. Of course such a structure as this was intended to last a life-time. So careful

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were they of this head-dress that they used a crescent-shaped pillow of earthenware, so that it might not be disturbed when they slept. Dr. Keller, who first described these crescent-shaped articles, thought they were religious emblems of the moon. He may be right, as the matter is not yet decided, but some think they were the pillows in question. At first thought this would seem absurd, but when we learn of the habits of the natives of Abyssinia and other savage races, we cease to wonder.

Illustrations of Crescent, Bracelet, and Hair-pin.--------

In speaking of the ornaments of the Bronze Age, a caution is necessary, because ornaments of bronze may belong to any age. Bracelets and rings have been quite numerous. The bracelets vary much in shape, are decidedly artistic in workmanship, and often set off with carved designs. Some of this shape are composed of a single ring of varying width, the ends of which almost meet and terminate by a semicircular clasp; others are a combination of straight or twisted wires ingeniously joined to one another. "Some of these ornaments remain even up to the present day in a

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perfect state of preservation. In an urn from one of the lake settlements six specimens were discovered, the designs of which appeared quite as clearly as if they had only just been engraved."

We are called on to notice one important point in reference to these bracelets and rings. That is, they are so small they could scarcely be worn nowadays; a fact leading us to infer that the people must have been of small size. It has also been noticed that the handles of the swords are smaller than would be convenient for soldiers now. Some ornaments of bronze were worn as pendants. For this purpose they were provided with a circular hole, and were probably worn suspended around the neck.

Illustration of Bronze Pendants.-------

Ornaments were not always of bronze. Necklaces were sometimes made of amber, and gold beads were quite common. We give a cut of both. They are from burial mounds of this age in England. We remember the ornamentations on implements in the Paleolithic Age was by engraving animal forms. In the Neolithic Age they

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seem to have cared very little for ornamenting. During the Bronze Age the ornamentation was of a simple but pleasing and uniform style. It consisted of simple geometrical patterns, combination of circles, dots, and straight lines. In this next figure we have given the principal designs found in France.

Illustration of Necklace and Beads.---------

In the arts of living an increase in culture is noticeable. We have seen that in Neolithic times they were acquainted with the use of the distaff. In the Bronze Age they manufactured woolen cloth. We have but few specimens of this cloth, because it is under only very exceptional circumstances that woolen fabrics can be preserved for any great length of time. From examinations of burial mounds of this period, it would appear that the better class of people were clad in linen and woolen. Probably the use of the skins of animals for dress purposes was mostly discontinued during this age. Woolen cloaks of this period have been found in Denmark, though probably dating from near the close.

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Illustration of Ornamental Designs.----------

In agriculture we detect only such advances as improved implements would suggest. They used the sickle in gathering in the harvest. We find no implements which we are sure were used for agricultural purposes. Yet they must have had some means of preparing the ground for the cereals. The day of wild animals was gone. In the lake settlements of this age the domestic animals outnumbered the wild species.

Illustration of Bronze Sickle.----------

During this age the horse was used for riding and driving, and oxen were used for plowing.

The proof of this fact is certain sketches found in Denmark. But the use of bronze in that country continued after iron had been introduced in the south of Europe. Pottery was more carefully made--though the wheel for turning it was not yet

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introduced. The shapes were varied and elegant; sometimes, instead of having a flat base, they came to a point below--in which case they had to be placed in a support before they could stand upright. Nearly all the pottery bears the ornamentation peculiar to the Bronze Age--that is, straight lines, dots, etc.

Illustration of Clay Vessel and Support.----------

During this age, the inhabitants were as much given to war and conquest as any rudely civilized people: we, therefore, meet with remains of their weapons. The principal ones were swords, daggers, spear-heads, and arrows. The swords are always more or less leaf-like in shape, double-edged, sharp-pointed, and intended more for stabbing and thrusting, rather than cutting. No hand guards were used.

Illustration of Bronze Weapons.----------

Sometimes the handles were fastened to the swords by means of

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rivets; and, at other times, the handle was plaited with wood or bone. They are of different lengths, intermediate between the sword and the dagger. It is doubtful whether they made use of shields.

Bronze shields are, indeed, found; but, from the ornaments and other circumstances they are generally considered to belong to the Iron Age: for we shall subsequently learn that the introduction of iron did not prevent the continued use of bronze. The bow was well known; and this must have necessitated the use of arrows. Some bronze arrows have been found; but a flint arrow is nearly as serviceable as bronze, and much cheaper, so we may be sure they were more common. They also employed spears and javelins, and the bronze heads of these weapons are found in various places. The invading Celt found many camps and fortified places already in existence, and continued them in use after the original occupant had been driven away.

Illustration of Mold.----------

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As we have spent some time in learning the different objects manufactured out of bronze, it may be of interest to learn somewhat of their methods of working bronze. We have already stated how the amateur worker in bronze would follow on after the trader--and so the objects of bronze would be made in all the countries of Europe. Molds have been found in various places. This is a mold for casting the axes having a socket in which to put the handle. It was found in the cave at Heathbury Burn, already mentioned. None of the bronze objects were forged out, as a smith forges out objects of iron--they were cast.

In the absence of steel, it would be almost impossible to cut bronze; hence it was necessary to make the casting as nearly perfect as possible. Sometimes the molds were cut out of stone, as in the figure just given. The molds themselves were, in this case, difficult to make; besides, they could scarcely be made so perfect as not to leave a little ridge, where the two halves of the mold came together, which, as just explained, owing to the absence of steel, it would be very difficult to remove.

In process of time they discovered an easier way of making the molds, that employed at the present day--that is, by the use of sand. The ridge would still remain, and is to be plainly seen on specimens of ancient bronze.

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To overcome the difficulty just mentioned, they invented a third method of casting, which displays great ingenuity. A model of the object desired was made of wood or wax, and inclosed in prepared earth mixed with some inflammable material, in order that, when subjected to heat, it might become porous. The whole was then heated until the wax or wood disappeared. The mold was then ready for use. The great advantage of this method was that there were no projecting lines of junction to disfigure the complete implement. This seems to have been the most common method employed. This explains the fact, that we seldom find any two bronze objects exactly similar to one another.

Any impression left on the wax model would be faithfully reproduced. Marks of the spatula, with which the wax was worked, are frequently found; and, in one case, the impression of the human finger was observed.

A people as highly cultured as those of the Bronze Age must have had some system of government, and one that was a sensible advance over the government of the Neolithic people. In the Neolithic Age it was, doubtless, tribe against tribe. Confederacies, the union of several tribes for common purpose of defense, must have been more common at this age. The first Aryan tribes to arrive in Europe, as we have seen, were the

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Celts. In time, they had to withstand the pressure of invasion themselves. The Belgae, and other Germanic tribes, were also on the move. But war at this period would partake more of the nature of people against people, than of tribe against tribe. The civil and the military departments of government must have taken more definite shape, and we are not without evidence of fairly organized and disciplined forces. As early as two thousand eight hundred years before Christ, the sea-coast people of Europe, while yet in the Bronze Age, allied their forces for the conquest of Egypt.

We have referred to the influence of trade in shaping civilization. It is commerce that to-day is carrying civilization to remote corners of the globe. Long before the dawn of history, it was an active agent in advancing culture. It is important to note the great expanse of commerce, both inland and marine, which prevailed during the Bronze Age. An important article of trade was, of course, bronze. The people who first learned the secret of its manufacture would speedily find a demand for their wares from surrounding tribes, and we have already pointed out how this trade would quickly give rise to local manufactures. But, to produce bronze, we know tin is just as necessary as copper--and all the countries of Europe are

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not provided with these metals; so more or less trade would inevitably take place. In various ways the stores of the bronze merchant might be lost, and only revealed in after years by accident. One of these deposits, found in France, is evidently the store of a merchant or trader from Etruria to the tribes of the north and west, and so gives us a quite vivid idea of the trade of that early time. It consisted of over four hundred articles of bronze, "comprising knives, sickles, lance-heads, horse-bits, rings, buttons, pendants, and bracelets."

As an article of adornment, amber was highly prized, not only by the people of Europe during the Bronze Age, but also by the people of the preceding Neolithic Age. This caused a trade to spring up which certainly did its share in enlightening the people. The main supply must have been obtained from the shores of the Baltic. That the trade was of importance is evidenced by the fact that amber has been found scattered over Europe in the tombs of the Neolithic and Bronze Ages.

We have given a passing glance at the religion of each age we have examined. It must be confessed that great uncertainty hangs over the results. From a close examination of their industries, we can gather considerable as to the home life and general

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enlightenment of prehistoric times. A knowledge of religious belief is gathered mainly from a study of their burial customs. This is a very important part of our investigation, because a religious belief is one of the exponents of the culture of a people.

We have seen that in the Neolithic Age the dead were buried surrounded by implements, weapons, and ornaments for use in the future life. The descendants of these people throughout Europe, even in the Bronze Age, would still continue this custom. The implements buried with the body were more often of stone than bronze. We must constantly bear in mind that bronze was costly. This will explain its absence in many cases. It is interesting to note in this connection that these are "cases in which it is evident that flint implements were deposited in graves rather in deference to ancient customs than because they were still in every-day use." We also notice that during this age, often the objects placed in the graves were, from their shape, obviously not intended for daily use. This would clearly indicate that the popular mind became impressed with the fact that these votive offerings, however freely given, could be of no assistance to the departed, but they still continued the custom because it was sanctioned by usage of past years.

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But the dead were not always buried during the Bronze Age, nor, indeed, as a general rule. The invading race doubtless brought with them a new religion. Many of the ornamentations on their swords, vases, and other articles, are supposed by some writers to be religious symbols. From the frequent occurrence of the circle, and combinations of circles, it has been suggested that they worshiped the sun. And the occurrence of customs observable even at a late day, in various portions of Europe, as pointed out by Prof. Nelson, show that the worship of the fire-god, or the sun, was once widely extended in Europe. On this point we are further told: "That even as late as the time of Canute the Great, there is a statute forbidding the adorement of the sun and the moon." So it is not strange that in the new faith a different method of burial would be followed. That was by cremation. "The dead were burned, were purified by being passed through the fire along with their possessions."
The ashes was then gathered together and placed in urns and burial mounds and barrows. The votive offerings of flint and bronze articles in daily use were also thrown in the fire, and their burnt remains placed with the other ashes in the burial urn. The cut is that of a bell-shaped barrow of the Bronze Age.

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Illustration of a Burial Mound.----------

We have just seen what inferences have been drawn from the use of the circle as an ornament. This is not the only sign that has been thought to have some symbolical meaning. The cross was also used as an ornament, and possessed probably some religious significance. A third figure which has caused some discussion was the triangle. "It is, on the whole, very probable that all these signs, which are not connected with any known object, bear some relation to certain religious or superstitious ideas entertained by the men of the Bronze epoch, and, as a consequence of this, that their hearts must have been inspired with some degree of religious feeling."

Illustration of Avebury Restored.----------

We have mentioned the use of stone circles in Neolithic times. During the Bronze Age they built the circle very large, sometimes twelve hundred feet in diameter, and they were

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sometimes made of earth. These circles are regarded by some as being simply burial places, and many of them have been proved to be such. But others regard them as temples, meaning thereby not a building, in our sense of the word, but a place of sanctity, and probably where some form of worship was held. "Even if we allow that they were originally tombs in every case, it does not follow that they have not also been temples, for the religious sentiment has, in all ages, and in all places, tended to center in tombs, which ultimately have become places of worship. Many of our Christian Churches have originated in this manner, and it is a most obvious transition from the tomb to the temple. The worship of the spirits of the dead at the one would naturally grow into the worship of the Great Unknown in the other.

The preceding cut is a restoration of one of the largest of these temples. Here we see a circle twelve hundred feet in diameter, of upright stones, guarded by both a ditch and embankment. From the two openings in the embankment formerly extended two long winding avenues of stone. Between them rises Silbury Hill, the largest artificial mound in Great Britain, being one hundred and thirty feet high. The area of the large inclosure was about twenty-eight and a half acres. This was a

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temple of no inconsiderable size. It was, of course in ruins when the earliest account of it was written, and we can only speculate as to the lapse of time since it was venerated as a place of worship.

Stonehenge, on Salisbury Plain, is a better known ruin, though not on as large a scale as at Avebury. The cut gives us a restoration of it. The outer circle of standing stones is one hundred feet in diameter, and when entire consisted of one hundred stones. These are of sandstone, and were obtained in the vicinity. A course of stone was laid along the top. We notice within a smaller circle of stone. The material of these stones is such that we know they must have come from a distance. Mr. James tells us that they are erratic--that is, bowlders brought from the North of Scotland by the glaciers--and that others of the same kind are still to be seen lying around the country. But the more common opinion is that they were brought there by the people from a distance, perhaps Cornwall or the Channel Islands. If this be true, it is evidence of a strong religious feeling, and a peculiar value must have been attached to the material, since for any ordinary monument the stones in the neighborhood would have sufficed. Still nearer the center were five groups of three great stones each, and immediately

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within these a horseshoe of smaller stones. Finally, near the head of the horseshoe, a great slab of sandstone is supposed to have served for an altar. The date of the two structures just described has been a matter of some dispute.

Illusration of Stonehenge Restored.--------

It is worthy of notice that in the immediate neighborhood of both of them are found a great number of barrows of the Bronze Age. Over three hundred were erected in the neighborhood of the latter. In the opinion of many this fixes their date in the Bronze Age. Stonehenge, in its ruined state, has formed the subject of no little speculation. Modern explorers, in connecting it with the Bronze Age, have not dispelled from it the enchantment of mystery. We must ever wonder as to the nature of the rites there observed. Our questionings meet with but feeble response; for though we have learned somewhat of past times, it is comparatively but little. Ruined columns, crumbling burial mounds, and remains of stone and bronze will always be surrounded with more or less mystery--a striking illustration that science is able to dispel but little of the darkness which

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unnumbered years have thrown around the culture of the past.

Illustration of Ancient Tower, Scotland.----------

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(2) Brace's "Races of the Old World," p. 60.

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(4) Dawkins's "Early Man in Britain," p. 343.

(5) "One mass estimated to weigh two hundred tons." Dana's "Manual of Mineralogy," p. 291.

(6) Evans's "Ancient Bronze Implements," p. 2.

(7) Rau's "Anthropological Subjects," p. 89. In his preface to this collection he asserts his belief, that "former inhabitants of North America, notwithstanding all assertions to the contrary, were unacquainted with the art of melting copper." Ibid., vii.

(8) Dawkins's "Early Man in Britain," p. 401.

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(11) Dawkins's "Early Man in Britain," p. 355.

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(17) Lubbock's "Prehistoric Times," p. 39.

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END OF CHAPTER VII.**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Processed by D.R. Thompson

drthom@ihug.co.nz

Chapter VIII

THE IRON AGE IN EUROPE.

Bronze not the best metal--Difficulties attending the discovery

of Iron--Probable steps in this discovery--Where this discovery

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was first made--Known in ancient Egypt--How this knowledge would spread--Iron would not drive out Bronze--The primitive Iron-worker--The advance in government--Pottery and ornaments of the Iron Age,--Weapons of early Iron Age--The battle-field at Tilfenan--Trade of early Iron Age--Invention of Money--Invention of Alphabetic Writing--Invasion of the Germanic Tribes--The cause of the Dark Ages--Connection of these three Ages--Necessity of believing in an extended past--Attempts to determine the same--Tiniere Delta--Lake Bienne, British Fen-beds--Maximum and Minimum data--Argument from the widespread dispersion of the Turanian Race--Mr. Geikie's conclusions--The isolation of the Paleolithic Age.

The introduction of bronze was the harbinger of better days to the various tribes of Europe. Without metals it is doubtful if man would ever have been able to raise himself from barbarism. His advance in civilization has been in direct proportion to his ability to work metals. As long as he knew how to work bronze only he could not hope for the best results. The trouble was not in the metal itself, but in the supply; for copper and tin, the constituents of bronze, are found only in limited amounts. When we reflect on the multiplicity of purposes for which some metallic substance is needed, we at once perceive that men

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require a metal which can not only be worked cheaply, but must exist in great abundance, so that the needs of a rich and varied culture may be met.

The Divine Author of nature has stored away just such a metal, and in such exhaustless quantities that it forms an ingredient in nearly all soils, and flows away in the waters of many springs and rivers. It exists in abundance in nearly every country of the globe, in some forming veritable mountain masses. We refer to iron, the king of metals; and when man had learned to reduce it from its ores he had taken the first step in a new direction, the end whereof is yet far distant.

We have in the preceding chapter presented some reasons why copper would be known before iron. In the first place, how were men to learn there was such a thing as iron? Supposing its ores did occur in abundance, there was nothing to attract attention to them. They were not of great heft, like tin ore or of striking color, like the ores of copper. In the hills, and under the foot of man, nature indeed had imprisoned a genius; but there was no outward sign by which man was to divine his presence. Copper, as we have seen, occurs frequently in a native form that is ready for use, without reducing from its ores.

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Native iron, on the contrary, is almost the rarest of substances, though it is reported as occurring in one or two localities on the earth. Almost the only examples of native iron has been obtained from meteorites. Strange as it may seem, these wanderers in space, which occasionally flame athwart the sky, consist largely of pure iron; at least this is true of such specimens as have from time to time been found on the earth's surface. This supply is of course extremely limited, yet some Siberian tribes are said to make knives from iron obtained in this manner. Moreover the evidence of language, as used by the ancient Greeks and Egyptians, would imply the meteoric origin of the first known form of the metal. But though such accidental finds might prove the existence of another metal, they would furnish no hint how to extract it from its ores, or indeed, that it existed in the form of ores.

The prolonged schooling in metallurgy, which men received during the Bronze Age, could not fail to give them many hints, and doubtless accidental discoveries of metallic substances were made. We can conceive how, by accident or design, iron ore, treated in a similar manner to copper and tin ore, would leave behind a mass of spongy iron. The difficulty would be in working it; for, as we have seen, they were in the habit of casting

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their articles of bronze. But iron is very difficult of fusion. It was a long while before they learned how to do that. They had therefore to learn an entirely new art--that is, to fashion their implements of iron by hammering the heated mass.

There is no reason to suppose that iron was first discovered in Europe. Its spread has been from the east and south to the north and west. It, in all probability, was discovered, like bronze, in Asia. Although evidence, both archaeological and traditional, goes to show that bronze was in use long before iron, yet iron has been known from time immemorial. Explain it how we will, civilization and history follow close after the knowledge of iron. Wherever the light of history first falls on the nations of the Old World, we find them acquainted with iron, but such knowledge, at least on the part of the Mediterranean nations, does not long precede history, for at that early time, iron was still a most precious metal. It was not yet produced in sufficient quantities to take the place of bronze; hence the prehistoric Iron Age was there but of short duration.

Among the early Egyptians iron was known, but was probably not very common. There is on this subject some diversity of opinion; some believing that at the very earliest historical period they

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were skilled in working it, and employed it in all the affairs of life, but others assure us that at the most ancient period they did not really use iron, and that bronze was the metal employed for all ordinary purposes.

A wedge of iron is said to have been found in a joint between the stones of the great pyramid. Here, then, at the dawn of historic times iron seems to be making its way among a bronze-using people. The ancient Chaldeans employed iron as an ornament, but not for implements. With them it was therefore a precious metal. Among the Assyrians, iron was largely used, and at a comparatively early date. A careful study of the poems of Homer shows that the Greeks of nearly three thousand years ago had a knowledge of iron, though it was a highly prized metal. But to the north of the Mediterranean the prehistoric Iron Age was of longer duration.

We can readily see that a knowledge of iron would spread in much the same way as did bronze. When first introduced, it would be rare and costly, and so would be used sparingly. Bronze axes have been found with the edge of iron. Afterwards, as it became more abundant, it would be used altogether for cutting instruments and weapons, while bronze, being more easily worked,

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would still be used for ornaments, brooches, etc. At Hallstadt, in Austria, was discovered a cemetery which evidently belongs to a time when iron was taking the place of bronze. In this case, the implements of bronze are those forms which we have learned were produced near the close of the Bronze Age. The iron implements are not those forms best suited for that metal, but imitations of those of bronze. We remember when bronze was first introduced, the weapons were simply copies of those forms already made in stone.

We may suppose that a knowledge of iron would spread rapidly. The knowledge of metallurgy necessary for the production of bronze was at this time widely disseminated. It would require, therefore, but a hint to start them in experiments. In the dissemination of this knowledge, commerce, of course, played a most important part. Whenever the early Greek and Roman writers have occasion to mention the arms of the less civilized tribes of Europe, we learn they were of iron. This shows that at a very early time this knowledge had spread all over Europe.

It is scarcely necessary to remark that the use of iron would not drive out the use of bronze. That would still be used for many purposes; and even stone would continue in use, at least

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for some purposes. At the battle of Marathon, arrow-heads and lances of stone were largely used. We can easily understand how, by one of a number of causes, some rude tribes, yet unacquainted with the use of metal, would come to occupy the site of some settlement, the inhabitants of which had been in the Bronze or Iron Age. This actually happened at ancient Troy, where the remains of a stone-using folk have been found above those of a people using metal. This, though an exception to the general rule, need give us no surprise.

Iron manufacture at the present day, is one of our great industries. In its present form it is the final development of an industry whose first unfoldings we have now to glance at. That the first process man employed to procure iron should have been very rude, is what we would expect. Some of the partially civilized tribes of to-day may give us an insight into the process employed. We are told that in Tartary each native makes the iron he needs, just as every household would make its own bread. The furnace is a very small affair, not holding more than three pounds of ore. This is filled with ore and charcoal. The bellows are used, and after the charcoal is all burned out, the result is a small piece of spongy iron, which needs only repeated heating and hammering to be made serviceable.

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Primitive furnaces, on a somewhat larger scale, have been discovered in Switzerland. Here the excavation was made in the side of a hill, and a rude, dome-shaped chimney built over it.

We must not forget that our task ends where the historian's begins. The use of iron did not long precede history, so we have but little to describe as to the customs and manners of life during the prehistoric Iron Age. A general advance in all the social arts must surely have taken place. Improved tools, and more cheaply produced, could not fail to advance man very materially in culture. Some lake settlements were still in use as places of residence, but better means of protection than water was now known--walled cities were in use, especially around the Mediterranean sea.

Mr. Morgan has traced for us the evolution of government. At this early date the Greek and Roman people were engaged in substituting for ancient society the modern idea of government founded on territory. The great body of European tribes were now in the final stage of barbaric life. Their system of government was doubtless the highest known to ancient society--that of confederacies; the union of tribes speaking dialects of the same language, for offensive and defensive purposes.

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Illustrations of Ornaments and Gold Ornament.----------

As characteristic of the advance of this epoch, we may mention the appearance of pottery made on the potter's wheel, and baked in an improved kind of furnace. Previous to this epoch all the pottery had been moulded by hand and baked in an imperfect manner in the open air. This may be thought to be but a small improvement. Our civilization, however, depends upon small improvements. Only during the early part of this age, while iron was scarce, and therefore valuable, would it be used for the purpose of ornaments. Iron brooches have been found in considerable quantities in the lake settlements. Bronze would still be the principal article used for ornaments. The articles of bronze manufactured play a great deal of skill. Nor was gold entirely forgotten. The cap-shaped ornament of gold was found in Ireland. During the Bronze age, as we have seen, there was no attempt made to represent animal forms by way of ornaments; but we meet with such representations during the early part of the Iron Age. This shows how they ornamented the sheath of a sword found in one of the Swiss lakes.

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Illustrations of Ornamental Sword-sheath and Swords.--------

The warriors of the early Iron Age possessed leaf-shaped swords for stabbing. The hilts were of bronze. This period was a struggle for existence, on the part of the various tribes of Europe. War must have been very common, so it is not strange that a large number of relics of this age are of warlike implements. Lance-heads, javelins, and arrow-heads have been found in abundance. It appears, from experiments ordered by the Emperor Napoleon III, that the javelins could only have been used as missile weapons, and that they were thrown, not by the hand merely grasping the shaft, but by means of a cord or thong, something after the principle of a sling.

Some years ago an old battle-field was discovered at Tiefenau, in Switzerland. On it were found a great number of objects made of iron, such as fragments of chariots, bits for horses, wheels, pieces of coats of mail, and arms of various sorts, including no less than a hundred two-handed swords. All of these were made of iron. The soldiers also carried with them shields, made

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sometimes of bronze, as in the cut below, or of wood, studded with iron.

Illustrations of Lance-head and Javelin and Shields.----

There is evidence of considerable volume of trade at this time. The Mediterranean was the theater of an extended commerce. Phoenician sailors not only ventured to brave the Mediterranean sea, but carried their vessels out on the Atlantic at as early a date as 500 B.C. The Greek traders were also active. Massilia, or as it is known in modern times, Marseilles, was the seat of a thriving trade. African ivory has been found in the tombs of Hallstadt, in Austria, in connection with ornaments of amber from the Baltic, and gold from Transylvania. The inhabitants of this town possessed in their salt mines the source of a lucrative trade. The trader of the Iron Age was able to take an immense stride by reason of the invention of money. Heretofore, in Europe, we have not met with coins, and trade must have been carried on by means of barter.

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Illustration of a Gallic Coin.----------

Acquainted as we are at the present day with money and the mechanism of exchange, it is difficult to see how any extended trade could be carried on without some unit of value, yet no coins are known earlier than the Iron Age. The most ancient coins known are Greek, and date back to the eighth century before Christ. This coin is one found in one of the lake settlements. It is made of bronze, and the figures are not stamped, but obtained by melting and casting. This, however, is not a Greek coin, but a Gallic one. On the battlefield of Tiefenau, mentioned above, several Greek coins, struck at Massilia, were found.

It is scarcely necessary to point out, that though iron gives its name to this age, it by no means follows that the only difference between this and the Bronze Age is the use of iron. "The pottery is different, the forms of the implements and weapons are different, the ornamentation is different, the knowledge of metallurgy was more advanced, silver and lead were in use, letters had been invented, coins had been struck." That wonderful invention, the phonetic alphabet, was made during

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the early part of this age. The past was no longer simply kept alive in the memory of the living, handed down by tradition and song. Inscriptions, and monuments, and books abounded, and we are no longer confined to an inspection of their handiwork, or examination of their habitations, and explanation of ancient burial mounds for our knowledge of their life and surroundings. It is no longer the archaeologists' collections, but the writings of the historian that unfolds past times and customs.

Let us cast a glance at the condition of Europe at the dawn of history. We have seen that in general terms the Bronze Age coincided with the arrival and spread of the Celts, though the earlier Celts were still Neolithic. The use of iron could scarcely have been inaugurated before the innumerable hordes of the Germanic tribes, probably driven from their Asiatic homes by the presence of invading people, were on the march. The world has, perhaps, never witnessed such a movement of people as convulsed Europe for several hundred years, beginning the second century before Christ and continuing until the fall of the Western Empire of Rome. The light of history dawns on a stormy scene in Europe. The Celts confined to the Western portion had been largely subjected by the Roman armies, but the largest portion of Europe held by the Germanic tribes was the seat from

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whence assault after assault was made on the Roman Empire, which at length, weakened by internal dissensions and enervated by luxury, split in twain, and the western, and most important part, fell before its barbarian foes.

The various tribes could not keep alive the civilization they had overthrown. The wandering hordes of Germanic people could not easily forget their former barbaric life, their marches of conquest, and careers of pillage. But the claims of civilization, though light and pleasant, are none the less imperative, and a people who seek her rewards must form settled communities, develop public spirit, organize government, and sink the individual in the public good. Not appreciating these claims, it is not strange that the incipient civilization nearly expired, and that the night of the Dark Ages enwrapt Europe. From out that darkness, composed of the descendants of the people whose culture we have been investigating, finally emerged the mediaeval nations of Europe.

The review has been a pleasant one, for it is a record of progress. The difference between the culture of the Neolithic and the Iron Age is great, but it is simply a development, the result of a gradual growth. Civilization and history have only

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hastened this growth. If we look around us to-day we can trace the elements of our civilization back through the eras of history, and though the faint beginning of some can be noticed, yet many of them come down to us from prehistoric times. We have treated of these early people in the three stages of culture known as the Neolithic, Bronze, and Iron Ages. We have seen there is no hard and fast line dividing the different stages of culture. To borrow the words of another, these stages of progress, like the three principal colors of the rainbow, overlap, intermingle, and shade off the one into the other, and yet in the main they are well defined.

We instinctively long to set bounds to the past, to measure it by the unit of years. It affords us satisfaction to give dates for events long since gone by. For any event in the domain of history, it is natural and appropriate to gratify this desire. It gives precision to our thoughts, and more firmly fixes the march of events. But the historical portion of human life on the globe is but a small part of the grand whole. When we pass beyond history, or into prehistoric times, we find ourselves utterly at a loss as to dates.

We have referred in the preceding pages to the commonly accepted

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belief of a few years ago, that, at most, a few thousand years express the whole period of human life on the globe. This was supposed to be the teaching of the Scriptures, but Infinite Wisdom left not only his word, but he left an imperishable record of the past in rocky strata and excavated valley, in dripping caves and mountain masses. When it was seen that the claims of geology for a greatly extended past, one transcending the powers of the human mind to conceive its length, could no longer be successfully denied, then it was that earnest investigators in the field of human antiquity could no longer shut their eyes to the fact that if geological evidence were worth any thing, man must have existed in the world for a far longer time than one covered by the brief period hitherto relied on.

This truth is so patent and plain that it has received the unqualified indorsement of the most learned scholars. Distinguished divines have been amongst its able expounders, and instead of being in opposition to the Bible, as already stated, the earnest reader finds in the periods of the geologists unexpected confirmation of its truths. The evidence of an extended past for man is not, however, wholly of a geological nature, though these have been the ones principally relied on.

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The archaeologist to-day summons to his aid the science of language, studies into the origin of civilization and the comparison of the different races of men, and derives from each and all of these concurrent testimony as to a vast, shadowy, and profound antiquity for man, one stretching way beyond the dawn of history, far into the very night of time.

As we have now spent some time in tracing out the culture of these early ages, it may be well to see if there are any means at our command to determine the absolute chronology of the various ages. At the very outset of our inquiry, we shall perceive that we have no such class of facts as guided our investigations into the age of the Paleolithic remains. We have but to recall the situation in which the implements of that age were found, always under such circumstances, that we see at once that a great lapse of time has passed since they became imbedded where found, and then the bones of the various extinct animals, found so associated with the implements, that we are justified, even compelled, to admit they occupied the same section of country, and then, from a variety of causes, we are satisfied that they occupied Europe at the close of the Glacial Age, if not for long ages before. All this gave us a point of departure, and we have showed with what care scholars have studied all

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questions relating to the date of the Glacial Age.

But aside from the fact that geology points out that a long time went by after the close of the Glacial Age before Neolithic man arrived on the scene, we are largely deprived of its aid in our investigations; for all the various implements and specimens of the household industries, from which we derive our knowledge of these latter ages, are found only in surface deposits; that is, in the modern alluvia and silt of river bottoms, in superficial deposits, in caves, and in peat-bogs; and even in other instances where apparently deeply buried, as in the submerged forest deposits of the British coasts, we know that, geologically speaking, their age is recent.

But in spite of these difficulties, attempts have been made from time to time to determine the absolute chronology of these ages. The results, however, can only be considered as approximations of the truth. We will call attention to some of these calculations. Their value to us consists in showing us the methods by which this problem has been attacked, and not in the results obtained. M. Morlot, of Switzerland, has sought to determine this question by a study of the delta of the Tiniere, which is a small river flowing into the lake of Geneva. Like all

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mountain streams, it brings down considerable quantities of sediment, with which it has formed a conical shaped delta. Cuttings for a railroad exposed a fine section of this cone, and showed that at three different times layers of vegetable soil, which must once have been its old surface were found.

The lowest surface was some twenty feet beneath the present surface, and here were found relics of the Stone Age. The second layer was at the depth of ten feet, and contained relics of the Bronze Age. Finally the first buried layer, three feet beneath the present surface, was found to contain relics of the Roman Age. Obtaining from other data the time that has elapsed since the deposits of the Roman layer, he readily calculates the age of the Stone and Bronze layers. By this means he obtains for the Bronze Age an antiquity of between three and four thousand years, and for the Neolithic Age from five to seven thousand years. M. Morlot does not claim for his calculation more than approximate accuracy. But if we were to allow it a greater accuracy than its author claims, it would still only show us that from a period of from five to seven thousand years ago, tribes of stone using folks lived in Switzerland. It tells us nothing as to their first appearance, or the total length of this age.

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Other calculations of a similar nature have been made. The Lake of Bienne, in Switzerland, has been gradually silting up along its margins from time immemorial. About seven hundred and fifty years ago there was an abbey built at one place on the then existing shore of the lake. Since that time the gain of land has been about twelve hundred feet. A considerable distance further up the valley are found the remains of a lake settlement of the Stone Age. If the gain of land has been uniform, it has not been far from seven thousand years since the lake washed round the ancient settlement. Of course the land may have gained faster at one time than at another, but from the general configuration of the valley it is considered that its gain was regular.

Mr. Skertchly, of the Geological Survey of England, has furnished still another estimate, based on the growth of the Fen-beds on the east coast of England. It is sufficient to state that he also arrives at an estimate of about seven thousand years for the Neolithic period. Now these results are interesting, and their substantial agreement is, to say the least, striking. We must remember, however, that none of them are free from error. They may serve to clear up our thoughts on this subject, but we notice they tell us nothing as to the

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beginning of the Neolithic Age.

Abandoning the effort to obtain dates for the various ages, attempts have been made to calculate the entire interval that has elapsed since the close of the Glacial times, and thus set bounds to the first appearance of Neolithic man. We briefly touched on this question in determining the antiquity of the Paleolithic Age, and we say, as far as this country was concerned, it was comparatively a recent thing, but as for Europe, it must be at a very remote time. M. Quatrefages has called our attention to two investigations in Europe, which, in order to understand this question, we will now glance at.
The waters of the Rhone carry into Lake Geneva every year quantities of sediment. In other words, from this and other sources, the lake is gradually being filled up.
Carefully calculating the amount carried into the lake in a year, estimates have been made of the length of time it has taken the river to fill up the lake as much as it has.

But in making this calculation the date arrived at was a maximum one--that is, a point beyond which it is not reasonable to suppose the time extended. These calculations gave as a result one hundred thousand years. The meaning of this is that the time

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elapsed since the close of the Glacial Age was something less than the number just stated. On the other hand, a minimum date for this time has been obtained by estimating the amount of erosion in the valley of the River Saone, in France. From this we know that the time can not be less than seven thousand years.

It is, perhaps, doubtful whether we shall ever be able to obtain satisfactory answers to these questions. From what we have repeatedly seen of the slowness of development of primitive man, we do not doubt but what the antiquity of Neolithic Man goes much farther back than seven thousand years. When a naturalist finds in widely separated parts of the world animals belonging to a common order, he is justified in concluding that the order is a very ancient one. To illustrate, the opossum belongs to an order of animals of which the only other representatives are found in Australia and the neighboring islands. We are not surprised, therefore, to learn that this order was the first to appear in geological time. We think the rule is equally applicable to races of men. We are told that the Turanian race, or, as it is often named, the Mongoloid race, is a very widely scattered one. Its representatives are found over the larger portion of Asia, in Northern Europe, the islands of the Pacific;

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and they were the only inhabitants of the New World at the time of the conquest. This wide dispersion would imply that they were one of the ancient races of the world, and as such their antiquity must be far greater than the above named number of years.

This point grows clearer when we see what light is afforded on this subject by historical research. The Turanian people were in full possession of Europe while yet the ancestors of the Hindoos and the various European nations dwelt together as one people in Asia. As a race they had grown old when the Celts commenced their wanderings. Egypt comes before us as a powerful people, at a time at least as early as six thousand years ago. Even at that time they had attained civilization. But we need not doubt that there is a long series of years lying back of that, during which this people were slowly advancing from a previous condition of barbarism. The Egyptian people themselves are, in part at least, descendants of a Turanian people that probably in former times occupied the valley of the Nile and North Africa.

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Mr. Geikie has lately gone over the entire ground from the point of view of a geologist. He ranges over a wide field, and appeals in support to writers of acknowledged ability in all branches of learning. Yet the impression we gather from his writings is that of ill-defined, but far-reaching antiquity, one necessary to account for the great climatic and geographical changes which he shows us have taken place since the Glacial Age. But he tells us that any term of years he could suggest would be a mere guess. We can not do better than leave the matter here.

Perhaps as a result of the research of our present scholars, we may soon have more precise results.

These closing essays have impressed on us clearly and distinctly the isolation of the Paleolithic Age. When we reflect on its prolonged duration, its remoteness in time, and its complete severance from the Neolithic and succeeding ages, we are almost ready to wonder whether they were indeed human beings.

But beginning with the Neolithic Age, we come to our own era. This primitive culture seems to have been the commencement of our own culture, and so the industries, household implements, and weapons of these ages possess a greater interest to us.

We have now completed our inquiry into prehistoric life in Europe, and are ready to turn our attention to other parts of the field. What we have thus far learned shows us how true it is that the past of human life on the globe is full of mystery.

We trust that what has been written will enable our readers to form clearer conceptions of life in Europe during these far

away times.

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(12) M. Desor, in "Smithsonian Reports," 1865, tells us that small brass rings were probably used by people of the Swiss lake villages of the Bronze Age epoch as money.

(13) Figuier's "Primitive Man," p. 310.

(14) Lubbock's "Prehistoric Times," p. 7.

(15) Lubbock's "Prehistoric Times," p. 17.

(16) Evans's "Ancient Bronze Implements," p. 1.

(17) "Smithsonian Report," 1860, p. 342.

(18) Ibid.

(19) Mr. Southall, in "Recent Origin of Man," p. 475, quotes, from Dr. Andrews, of Chicago, to the effect that these calculations are very erroneous, as he thinks that M. Morlot forgot that the size of the cone would increase more and more slowly. On the contrary, M. Morlot says as follows: "Only this

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growth must have gone on at a gradually diminishing rate, because the volume of a cone increases as the cube of its radius. Taking this fact into consideration, etc." (Smithsonian Report, 1860, p. 341.) There are, however, several objections to this calculation, for which see Lubbock's "Prehistoric Times," p. 400; also Quatrefages's "Human Species," p. 138.

(20) Lubbock's "Prehistoric Times," p. 402. For criticisms on this calculation see Southall's "Recent Origin of Man."

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END OF CHAPTER VIII.**********

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The Prehistoric World: or, Vanished Races

by E. A. Allen

Processed by D.R. Thompson

drthom@ihug.co.nz

Chapter IX

EARLY MAN IN AMERICA.

Conflicting accounts of the American Aborigines--Recent discoveries--Climate of California in Tertiary Times--Geological changes near its close--Description of Table Mountain--Results of the discoveries there--The Calaveras skull--Other relics--Discussion of the question--Early Californians Neolithic--Explanation of this--Date of the Pliocene Age--Other

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discoveries bearing on the Antiquity of man--Dr. Koch's discovery--Discoveries in the Loess of Nebraska--In Greene County, Ill.-- In Georgia--Difficulties in detecting a Paleolithic Age in this country--Dr. Abbott's discoveries--Paleolithic Implements of the Delaware--Age of the deposits --The race of Paleolithic man--Ancestors of the Eskimos--Comparison of Paleolithic Age in this country with that in Europe--Eskimos one of the oldest races in the World.

When the energy and skill of Columbus were crowned with success, and the storm-tossed Atlantic was found to lave the shores of a western continent, reflecting minds in Europe were much interested in the strange stories they heard of the inhabitants of the New World. On the one hand Spanish adventurers told scarcely credited stories of populous cities, temples glittering with gold and silver ornaments, and nations possessed of a barbaric civilization scarcely inferior to their own. On the other hand were accounts of morose savages, cruel and vindictive in nature, depending on fishing and the chase for a livelihood. Nearly four centuries have elapsed since that time. The aboriginal inhabitants have nearly disappeared, leaving their origin and prehistoric life almost as great a riddle to us as it was to the early colonists.

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But in endeavoring to unroll the pages of their history, we have chanced upon some strange discoveries. The Aztecs, that people whose culture is to-day such an enigma to our scholars, are known to be a late arrival in the valley of Anahuac. They were preceded in that section by a mysterious people, the Toltecs, whose remains excite our liveliest curiosity, but of which we have yet learned but little. Yucatan is shown to have been for many centuries the home of a people whose advancement equated that of the Aztecs at their palmiest day. Like important discoveries attended the labors of explorers in the North. The entire valley of its great river is known to have been the home of a numerous population, that, from the nature of their remains, we call the Mound-builders. Who these people were, when and whence they came, and whither they went, are questions whose solution is by no means accomplished. Nor are such discoveries the only results. A study of their institutions has done much in revealing the constructions of ancient society, and thereby throwing light on some mysterious chapters of man's existence.

Of late years interest in the antiquity of man in America has been reawaked by the discoveries of human remains in Pliocene deposits in California, and the Glacial gravel of the Delaware at Trenton, New Jersey. Before this it was supposed that we had

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no authentic instance of human remains in America found under such circumstances that it was necessary to assign to them a profound antiquity. If these latter day discoveries be true, we can not escape the conclusion that man lived in America at as early a date as that indicated by any of the European explorations. Some hold that the proof of his existence here in Pliocene times is far more satisfactory than any evidence of his presence in Europe during this time. There is something fascinating in this belief. If some of the most eminent scientists of America are not mistaken, man lived on our Pacific coast before the great ice-sheets that pulverized the surface of the earth and dispersed life before them came down from the north. He ranged along the western rivers before the volcanic peaks of the Sierras were uplifted, and his old hunting-grounds are to-day buried underneath the greet lava flow which desolated ancient California and Oregon. But this assertion has not been allowed to pass undisputed, nor has it received the assent of all scientists.

We can easily understand why scholars subject all questions relating to the first appearance of man to very careful scrutiny. If a competent geologist should assert that he had found, in undoubted Pliocene formations, bones of some species

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of animals not hitherto suspected of living at that date, his statement would be accepted as proof of the same. But in the case of man, every circumstance is inquired into. It is but right that the utmost care should be exercised in this direction. But, on the other hand, we are not justified in demanding mathematical demonstration in every case of the accuracy of a reported discovery. Yet such seems to be the position of a portion of the scientific world. For, although they willingly admit that man has lived on the earth for a very long time indeed, they urge all sorts of objections to extending that time into a past geological age.

Accordingly, when Professor Whitney states as the result of many years spent in the investigation of the Tertiary formation of California, that he finds evidence of the existence of man in the Pliocene Age, it is not strange that one part of the scientific world listens incredulously to his statements, and are at once ready to explain away the facts on which he relies. He may, of course, be mistaken, for it is human to err, but his proofs are sufficiently strong to convince some of the best scholars in America. We can do no more than to lay the facts before the reader and let him judge for himself.

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We have seen what a genial climate prevailed in Europe during the Tertiary Age. This must also have been true of California. A rich and varied vegetation decked the land. The great trees of California of our day then flourished in Greenland, Iceland, and Western Europe. The cypress of the Southern States was then growing in Alaska and other high northern latitudes. The climate probably passed from a tropical one, in early Tertiary times, to a milder or temperate one in Pliocene times. Amongst the animals inhabiting America were three species of camels. Rhinoceroses, mastodons, and elephants trooped over the land. Tigers and other carnivore prowled in the forests. Herds of horse-like animals, one scarcely distinguishable from our common horse, grazed in the valleys, along with several species of deer. From the presence of the old drainage beds, we know that majestic rivers rolled their watery burden through the land. Such a country might well afford a home for man if he were present.

To understand fully the course of events which now took place we must venture on geological ground. The great Pacific Ocean, lying to the west of America, is constantly exerting a lateral pressure, which during Tertiary times showed its effect in the uplifting of the great mountain ranges of the western coast. During late Tertiary times, as a counterpart to the upward

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movement, a great subsidence commenced in the Pacific region. Doubtless many islands, some think an entire continent even, disappeared beneath the waves. The completion of the various mountain ranges left the coast firm and unyielding; hence, as it could not bend before the fiery flood forced upward from below by the downward motion just mentioned, it broke, and the torrent of molten rock leaped out as a lava flow. In consequence of this, near the close of Pliocene times, the surface of California and Oregon, especially the north of California, became buried under the lava and ashes of the most desolating volcanic outbreak that the earth has ever known.

Let us now see what bearing this has on the question of the antiquity of man. Scattered here and there throughout California are numerous masses of basaltic lava, which appear as elevated ridges, the softer strata around having been denuded away. They have received the general name of Table Mountains. They have not only been noted for their picturesque beauty, but miners long since found that the gravels underneath the lava covering were rich in gold. In Tuolumne County the Table Mountain is a flow of lava which originated in lofty volcanoes several miles away.

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It extends along the north side of the Stanilaus, which is a small river flowing in a south-westerly course through the county. The mountain is in the form of a ridge about two thousand feet above the present level of the river. At one point the river breaks through this ridge, which has been worn away for a considerable distance. From this point the ridge appears as a continuous mountain, stretching away to the south for a distance of twenty miles, from where it crosses the river.

"As seen from a distance the Table Mountain reveals its origin at once, in the contrast between the long, straight line of its upper edge and the broken and curving ones which the eroded hills of the auriferous strata everywhere exhibit. Its dark color and comparative absence of trees and shrubs on its top and sides also indicate very clearly that the materials of which it is composed are very different from that of the surrounding hills."

This is the celebrated Table Mountain of Tuolumne County. It is simply a vast flow of lava. It must have been a grand sight when this river of fire came rolling down from its volcanic fount. Its present position on top of an elevated ridge is a very singular one. In explanation of that we arrive at some very important conclusions, and we can not fail to be impressed with

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the fact that countless ages have rolled away since that lava flood poured down the mountain side. "No one can deny that a stream of melted lava, running for forty miles down the slope of the Sierra, must have sought and found a depression or valley in which to flow; for it is impossible that it should have maintained for any distance its position on the crest of a ridge." Lava is about as thick as molten iron, and would as surely seek some valley in which to flow as would so much water. "The valley of the Stanilaus, now two thousand feet deep, could not then have existed; for this flow of lava is clearly seen to have crossed it at one point."

"The whole face of the country must, therefore, have undergone an entire change since the eruption took place, during which this mass of lava was poured out. The valley of the Stanilaus must have then been occupied by a range of mountains. The same is true of the other side, where now is the valley of Wood's Creek; for such ranges must have existed in order to form and wall in the valley in which the current of lava flowed.
There has been, therefore, an amount of denudation during the period since this volcanic mass took its position of not less than three or four thousand feet of perpendicular depth, and this surprising series of changes is not peculiar to one

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locality, but the whole slope of the Sierras, through the gold region, is the scene of similar volcanic outflows and subsequent remodeling of the surface into a new series of reliefs and depressions."

Illustration of Imaginary Section of Table Mountain.-------

In order to fully realize the change here spoken of, an imaginary section of Table Mountains is here presented. Here we see the two valleys on the sides, and the mass of lava covering the top of the mountain. The dotted lines represent the position of the old line of hills, which must once have inclosed the valley down which coursed the fiery torrent.

We require to dwell on this, fact before we can fully understand its meaning. The "eternal hills," two and three thousand feet in height, have been completely washed away, and where they stood is now a deep valley. But the old valley, protected by its stony covering, is now a mountain ridge; and this, we are told, is not a solitary instance, but the entire surface of the country has been thus denuded. We stand in awe before the stupendous

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results, which nature, working through vast cycles of time, has accomplished.

But if this lava flow took place in a pre-existing valley, we ought to find under the rocky covering beds of gravel, rolled stones, and other *debris* peculiar to a river bed.

Such, in fact, we do find extended along directly underneath the lava, about fifteen hundred feet above the general level of the country. These old river gravels are found to be very rich in gold, and miners have tunneled into them in numerous places in search of the valuable metal. In order to determine the geological age of these gravels, and subsequent lava flow, a careful examination of portions of plants and bones of animals found therein has been made. The plants are pronounced by competent authority to be Pliocene, totally distinct from any specimens now growing in California. The animal remains are rhinoceroses, camels, and an extinct species of horse. The age of these gravels is, therefore, pronounced to be Pliocene.

We would say in this connection that the auriferous gravels of California have been the object of a very careful research by Prof. Whitney. He adds to his conclusions that of another of the State geologists. We need not give in detail his arguments, but he reaches the conclusion that the auriferous gravels of the

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Pacific slope represent the whole of the Tertiary Age.

We have seen that in the ancient gravels of European rivers archaeologists have found the materials wherewith to build a fascinating story of man's appearance in Quaternary times. We have underneath the lava flow of California the gravel beds of rivers far antedating the gravels of the Somme. It is therefore not a little interesting to learn from Prof. Whitney that he finds many proofs of the existence of man in the gravels of the Pliocene Age in California. Under the solid basalt of Table Mountain have been found many works of men's hands, as well as the celebrated "Calaveras Skull."

Illustration of Calaveras Skull.----------

This skull was taken from a mining shaft at Altaville, at a depth of one hundred and thirty feet from the surface, beneath seven different strata of lava and gravel. Prof. Whitney was not present when it was found. He, however, made it his business to examine into the facts of the case, and he thus speaks of it: "That the skull was found in these old, intact, cemented gravels

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has been abundantly proved by evidence that can not be gainsaid." And again: "So far as human and geological testimony can at present be relied on, there is no question but that the skull was found under Table Mountain, and is of the Pliocene Age."

This would seem to be pretty explicit, but, as we have said before, Prof. Whitney, in his formal report as the State geologist of California, reaches the conclusion that the auriferous gravels of the Pacific are all of the Tertiary Age. It is therefore not a little interesting to learn that numerous instances are recorded of the finding of human remains or the works of man in these gravels. Prof. Whitney mentions twenty such instances. Mr. Bancroft furnishes us a list of such discoveries, giving as his authority Mr. C. D. Voy, of the California Geological Survey, of Oakland, California. He states that Mr. Voy personally visited most of the localities where the discoveries were made, and took all possible pains to verify their authenticity, and in many cases obtaining sworn statements from the parties who made them.

Two stone mortars and spear-heads, six and eight inches long, were found in the gravel under Table Mountain, just mentioned.

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These relics were found about three hundred feet from the surface. A hundred feet and more of this depth was of solid lava. At another place a stone bead was found three hundred feet from the mouth of the tunnel, under a thick layer of lava. Many other instances might be given of such discoveries, not always under lava coverings, but always in such instances that we are compelled to assign to them an immense antiquity. As, for instance, at San Andreas, according to a sworn statement in Mr. Voy's possession, large stone mortars were taken from a layer of cemented gravel, overlain by one hundred and twenty-five feet of volcanic and gravel materials. Many similar instances are on record, but enough have been mentioned to serve the purpose of the chapter.

As we have briefly gone over the ground on which the antiquity of man in America is, by some, referred to the Pliocene Age, it is but fair to notice some of the objections that have been raised. It is not necessary to point out that the only questions worthy to be considered are of a scientific nature.

We must deny either the age of the gravels themselves or that the objects of human handiwork were found as claimed, or else that they are of the same age as the gravels. Prof. LeConte

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thinks, from the nature of the gravels and the peculiar circumstances which surround them, that they are not older than the close of the Pliocene Age. He thinks they, in fact, belong to the transitory period between that age and the Quaternary. But as we are considering the question of Pliocene man, it makes but little difference if the gravels do belong to the very close of that period. They may still be called Pliocene.

One great trouble with those remains is that they were not discovered by professed geologists. We have to depend upon the statements of miners. But if their statements can be believed (and why should they not?), there is no doubt about their genuineness. The testimony, as Mr. Whitney says, "all points in one direction, and there has never been any attempt made to pass off on any member of the survey any thing out of keeping, or--so to speak--out of harmony with what has been already found, or might be expected to be found. It has always been the same kind of implements which have been exhibited to us, namely, the coarsest and the least finished, which one would suppose could be made, and still be implements at all." This result would hardly be possible, where so many parties are concerned in furnishing the evidence, if the objects were not genuine.

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In opposition to this conclusion it has been urged that the stone mortars, pestles, etc., have become imbedded in the gravel by the action of streams, or slips from the mountain side in modern times, or are the results of interments or mining operations. As an illustration of how they might become buried by the action of streams, reference is made to somewhat similar discoveries in the tin-bearing streams of Cornwall (Wales). We know with considerable certainty that at a very early date the Phoenicians worked in the gravels of these streams for tin ores. Implements made use of by them and others--such, for instance, as shovels, mortars, pick-axes, stone bowls, and various dishes--have been found at all depths in this gravel, by more modern miners.

This may explain the presence, in some instances, of similar remains in California, but it utterly fails to do so, where the remains have been buried underneath a lava flow or a bed of volcanic materials, as is the case in many of the instances we have cited. Manifestly no water has disturbed their strata since the volcanic materials were laid down. Neither can we think of a land-slide carrying these remains into the heart of a mountain, or burying them underneath a hundred feet of lava. The peculiar

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position in which they were often found is surely lost sight of by those who think they might have been placed there by interment. We can not think of a savage people digging a grave in such a position.

It has been urged with considerable force that these relics have been left behind by ancient miners when they mined for gold. Dr. Wilson is cited as authority for the statement that the Mexicans obtained "silver, lead, and tin from the mines of Tasco and copper was wrought in the mountains of Zacotollan by means of galleries and shafts, opened with persevering toil where the metallic veins were imbedded in the solid rock." Prescott, the historian, also testifies to the same fact.

We need only add to this, that wherever these ancient galleries were opened in the solid rock, they still exist. Schoolcraft mentions finding one two hundred and ten feet deep. The chances are not worth considering, that these old mines would be overlooked. If, for instance, the Calaveras skull is that of a prehistoric miner, killed in an old mining gallery only a thousand years or so ago, it is inconceivable that all evidence of this mine should have disappeared. Or, if in one case it should have done so, it would surely have been

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detected in other instances. The variety and explicitness of the testimony brought forward makes all such supposition improbable.

It is best, in this matter, to hold the judgment in suspense. We have stated Mr. Whitney's position, and the objections that have been raised to it. The amount of thought bestowed on the antiquity of man will doubtless soon clear up the whole matter. We can not do better than to consider his surroundings, supposing that he was really present. The country must have been very different from the California of to-day. Dr. Cooper says, "The country consisted of peninsulas and islands, like those of the present East Indies; resembling them also in climate and productions." The probabilities are that to the west and southwest of California, instead of watery expanse of the Pacific, only broken here and there by an ever-verdant islet, there was either a continental expanse of land or, at any rate, a vast archipelago. We know that over a large part of the Northern Pacific area the land has sunk not less than six thousand feet since late Tertiary times.

We are certain the ocean area must have presented a vastly different aspect before that depression commenced. It is not

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unreasonable to suppose that communication between North America and Asia was much easier than in subsequent epochs. It might have been an easy matter for man to pass back and forth without losing sight of land. It is therefore reasonable to suppose that if Pliocene man was in existence, he would have occupied both sides of the Pacific at this early time. These last conclusions are very important ones to reach, and as there is reasonable foundation for them, we must bear them in mind in the subsequent pages.

It will be remembered that the races of men who inhabited Europe in the Paleolithic Age had only very rudely formed, unpolished implements. It is not until we arrive at the Neolithic stage of culture that we meet with specimens of polished stone implements. To judge from the specimens of early Californian art, the beautifully polished pestles, beads, plummets or sinkers, spear-heads, etc., Pliocene man in California must have been in the Neolithic stage of culture. Though they were not acquainted with the potter's art, yet from their skill in working vessels of stone, they had undoubtedly passed entirely through Savagism, and had entered the confines of Barbarism, as far advanced, in fact, as many of the Indian tribes the Spaniards found in possession of the country.

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It must be confessed this seems very singular. It is this statement that causes many to shut their eyes to what would be otherwise at once admitted and refuse to believe the genuineness of the discovery. If the implements brought to light had been of the rude River Drift type--celts but little removed from nodules of flint--scholars would not be so cautious about accepting them. But when we learn they are Neolithic, we at once see why they hesitate, and ask for more conclusive proofs; yet this is no reason to disregard the discoveries. They may be a great surprise, they may be an unwelcome discovery to the holder of some theories, yet the only question is, whether they are true or not, and if true, theories must be modified to fit the facts. Prof. Putnam thus speaks, in reference to them: "As the archaeologist has no right to be governed by any pre-conceived theories, but must take the facts as he finds them, it is impossible for him to do otherwise than accept the deductions of so careful and eminent a geologist as Prof. Whitney, and draw his conclusions accordingly, notwithstanding the fact that this Pliocene man was, to judge by his works in stone and shell, as far advanced as his descendants were at the time of the discovery of California by the Spaniards."

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Perhaps a partial explanation of this matter may be found when we consider all the circumstances of the case. The origin of man is generally assigned to some tropical country. Sir John Lubbock thus speaks of it: "Our nearest relatives in the animal kingdom are confined to hot, almost tropical climates; and it is in such countries that we are, perhaps, most likely to find the earliest traces of the human race." This is also the opinion of other eminent scholars. M. Quatrefages thinks that man probably originated in Asia. He points out, however, that, during Tertiary times, the climate was much milder, and man might have originated in Northern Asia. Now, if it be true that a great mass of land has disappeared beneath the waves of the Pacific, why may we not suppose that, if this sunken land was not the original home of man, it was at a very early time inhabited by him; that here he passed through his experience in savagism? We know how suited the islands of the Pacific are to the needs of a savage people; and we must not lose sight of the probable ease with which they could reach the coast of California--and also of what Dr. Cooper has told us of the climate and geographical surroundings of California at that early time. So it may not be unreasonable to suppose that man reached California long ages before he wandered into Europe, and so reached the Neolithic stage of culture much earlier than he did

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in other parts of the world.

It might be objected, that if a people in the Neolithic stage of culture lived in California in the Pliocene Age, they ought to have reached a very high stage of culture indeed when the Spaniards invaded the country. This is what we would expect had they been left to develop themselves. The great geographical changes that took place near the close of the Pliocene would cut off the primitive Californians from the Asiatics. Not only was the land connection--if it indeed existed--now destroyed, but causes were changing the climate. Ice and snow drove from the north life of both animals and plants, and for an entire geological period communications with Asia by way of the north must have been very difficult, if not cut off altogether.
Who can tell what changes now came to the Asiatic branch of these people? We are but too familiar with the fact that nations and races sicken and die: many examples could be given.
The natives of the Sandwich Islands seem doomed to extinction.
In a few centuries, the Indians of America will live only in tradition and song.

Such may have been the fate of the early inhabitants of the Pacific continent: certainly it would not be surprising, if the

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immense climatic and geographical changes which then took place would produce that result. Or it may be that but a scanty remnant lived on, absorbed by more vigorous, though less highly cultivated stocks of the same people, whose homes had been on the main-land of Asia--and the remnant left along the Pacific coast must have lived on under vastly different circumstance. The interior of North America was largely a dreary expanse of ice and snow down to the 39th parallel of latitude. It is quite true, this great glacier did not reach the Pacific Slope; but it must have exerted a powerful influence on the climate: and the evidence points, that the Sierra Nevada were occupied by local glaciers which reached down into the fertile expanse of the plains.

This was certainly a far different climate, and a far different country, than that which sustained a vegetation of a tropical growth. It may well be that the people should, as a result of their changed conditions, have deteriorated in culture; or, at any rate, their progress toward civilization may have been stopped, and many thousands of years may have passed with no perceptible improvement. It may be objected, that man will improve under any state of existence, give him time enough. This is, doubtless, in the main true. But a race may early reach

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its limit of culture; in which case, as a race, it will not improve: we may do much with the individual, but nothing, or but very little, for the race.

In these considerations which have been advanced we may find some reason for the early appearance of Neolithic man, as well as the fact that he advanced no farther in culture. But whether man first arrived in California in Pliocene times or not, he continued to inhabit the land to the present day. He would, however, be exposed to assault after assault from invading tribes. We do not wish to examine the question of the origin of the native Americans. It is held, by the best authorities, that at least a portion of them came from Asia, using the Kurile Islands as a stepping stone. Reaching the main-land of America, and passing down the coast, they would, sooner or later, reach the Valley of the Columbia--which has been characterized as the most extraordinary region on the face of the earth in the variety and amount of subsistence it afforded to tribes destitute of a knowledge of agriculture. At certain seasons of the year the rivers are crowded with fish, and they are then caught with the greatest ease. As a mixture of forest and prairie, the country is an excellent one for game. A species of bread-root grew on the prairies; and, in the Summer, there was a

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profusion of berries. To these advantages must be added that of a mild and equable climate.

These combined advantages would make this valley one of the centers of population, from whence would issue successive bands of invading people. A portion of these, passing over into California, would come in contact with the descendants of Pliocene man. The result would be, that the primitive inhabitants, unable to escape to the west, would come in contact with wave after wave of invading tribes. This is not altogether theory. All inquirers into the customs, arts, and languages of the primitive Californians have been struck with the remarkable commingling of the same. We are driven to the conclusion that here has been the meeting ground of many distinct tribes and nations. "From such a mixture, and over-population of the most desirable portions of the country, would naturally result the formation of the hundreds of petty tribes that existed in both Upper and Lower California when first known to the Spaniards."

In view of these facts, it is not strange that no advance in culture is noticeable; and the grounds just mentioned may go far to explain why we catch sight, here and there, of bits of

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customs, habits, and manners of life which strangely remind us of widely distant people--though it will not explain the presence of words of Malay or Chinese origin which are claimed to exist. What is known as the Eskimo trace is quite marked in the physical characters and in the arts of the Californians. It is, probably, the continuance of the type of the primitive American race.

It would naturally be interesting to know whether any date can be given for the Pliocene Age, and so give us some ideas as to the antiquity of man, if he were really here during that epoch. This, however, is one of the most difficult questions to answer, and in the present state of our knowledge incapable of solution. Approximations have, of course, been made, and, as might be expected, vary greatly in results. When it was acknowledged on all hands that on geological grounds the age of the earth was certainly very great, many times the few thousand years hitherto relied on, it is not strange that popular thought swung to the other extreme, and hundreds of millions of years were thought necessary to explain the series of changes which the geologists unfolded. This demand for a greatly extended time was strengthened when the law of the gradual evolution of life was expounded by the modern school of naturalists, and as great a

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lapse of time as five hundred millions of years was not deemed an extravagant estimate. Sir William Thompson has, however, demonstrated that the time that has elapsed since the crust of the earth became solidified can not be far from one hundred millions of years, and consequently we know the time since the appearance of life must be greatly less than that number of years.

Attempts have been made to estimate the length of time required to form the sedimentary crust of the earth. The results are so divergent on this point that it is best not to adopt any standard at present. Our views on this matter are also dependent on the time that has elapsed since the close of the Glacial Age, which, as we have seen, is not yet a settled point. If it be true that the islands of the Pacific commenced to sink during late Tertiary times, then we have a measure of that time in the growth of coral, which has required at least four hundred thousand years to form reefs the thickness of some that are known to exist.

But here, again, it seems we are not certain when this depression commenced. In a previous chapter we have gone over the Glacial Age, and have seen when, according to Mr.

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Croll's theory, it commenced. This was probably not far from the close of the Pliocene Age. We might as well leave the matter here. There are so many elements of uncertainty that it is doubtful if we will ever be able to assign satisfactory dates to the epoch.

In bringing to a conclusion this somewhat extended notice of early man in California we have to admit that much of it is speculative; still it is an endeavor to explain known facts. The main statement is that man lived in California in the Pliocene Age, in the Neolithic stage of culture. Whether the arguments adduced in support of this statement are sufficient to prove its accuracy must be left to the mature judgment of the scientific world. There is no question but that the climate and geography, the fauna and the flora, were then greatly different from those of the present. Starting with these known facts, so strange and fascinating, it need occasion no surprise, if the pen of the enthusiastic explorer depict a scene wherein facts and fancy are united.

In this case truth is certainly stranger than fiction, and when, in imagination, we see the great Pacific archipelago emerge from the waves, and, in place of the long swell of the ocean, we

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picture the pleasing scenes of tropic lands, the strange floral growth of a past geological age, the animal forms which have since disappeared, with man already well advanced in culture: when we recall all this, and picture forth the surprising changes which then took place, the slowly subsiding land, the encroaching waters, and the resultant watery waste, with here and there a coral-girt island, the great volcanic uplift on the main-land, the flaming rivers of molten lava, which come pouring forth, followed by the night of cold, ice, and snow: when we consider these, and the great lapse of time necessary for their accomplishment, how powerless are mere words to set forth the grandeur and the resistless sweep of nature's laws, and to paint the insignificance and trifling nature of man and his works!

The discoveries in California are not the only instances of the relics of man and his works found under such circumstances that they are relied on by some to prove the great age of man in America. But on account of the rarity of these finds, and the contradictory statements and opinions respecting them, the scientific world has until lately regarded with some distrust the assertion of a great antiquity for man on this continent; but a review of the evidence on this point, and especially of Dr. Abbott's discoveries in New Jersey, must impress on all the

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conclusion that tribes of men were living here at the close of the Glacial Age, and probably long before that time.

It need occasion no surprise to learn that several of the discoveries of former years, relied on in this connection, have since been shown to be unreliable. They have not been able to stand a careful examination at the hands of later scholars. They were made when European savants were first communicating to the world the results of the explorations of the river gravels and caves of that country. The antiquity of man being amply proven there, may afford some explanation why more discriminating care was not employed. Of this nature were some of the discoveries in the valley of the Mississippi; such, for instance, as the portion of the human skeleton found mingled with the bones of extinct animals a few miles below Natchez, and the deeply buried skeleton at New Orleans, in both of which cases a simple explanation is at hand without the necessity of supposing a great flight of years.

Some of these discoveries yet remain an unsettled point. Such is the discovery of flint arrow-heads in connection with the bones of a mastodon found in Missouri. Dr. Koch, who made the discovery, draws from the facts of the case such a suggestive

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picture that we will give his own words. After describing where found, he says: "The greater portion of these bones had been more or less burned by fire. The fire had extended but a few feet beyond the space occupied by the animal before its destruction, and there was more than sufficient evidence that the fire had not been an accidental one, but, on the contrary, that it had been kindled by human agency, and, according to all appearance, with the design of killing the huge creature which had been found mired in the mud, and in an entirely helpless condition. All the bones which had not been burned by the fire had kept their original position, standing upright and apparently quite undisturbed in the clay, whereas those portions which had been extended above the surface had been partially consumed by the fire, and the surface of the clay was covered, as far as fire had extended, by a layer of wood ashes, mingled with larger or smaller pieces of charred wood and burnt bones, together with bones belonging to the spine, ribs, and other parts of the body, which had been more or less injured by the fire. It seemed that the burning of the victim and the hurling of rocks at it had not satisfied the destroyers, for I found also, among the ashes, bones, and rocks, several arrow-heads, a stone spear-head, and some stone axes."

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Such is Dr. Koch's very interesting statement of this find.

"It was received by the scientific world," says Foster, "with a sneer of contempt," and, it seems to us, for very insufficient reasons. It is admitted that his knowledge of geology was not as accurate as it should have been. He made some mistakes of this nature, which have been clearly shown. Still, he is known to have been a diligent collector, and we are told "no one who knew him will question but that he was a competent observer."

It seems to us useless to deny the truth of his statements. There is, however, nothing to necessitate us believing in an immense age for these remains. This is not to be considered a point against them, for there is no reason for supposing that the mastodon may not have lingered on to comparatively recent times, and that comparatively recent men may not have intercepted and destroyed helpless individuals. Indeed, we are told there are traditions still extant among the Indians of these monsters.

We have other facts showing that, in this country as in Europe, man was certainly living not far from the time when the land was covered with the ice of the Glacial Age, whatever may be true of still earlier periods. We are told that, when the time came for the final breaking up of the great glaciers, and while they

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still lingered at the head waters of the Platte, the Missouri, and the Yellowstone rivers, a mighty lake--or, rather, a succession of lakes--occupied the greater portion of the Missouri Valley. The rivers flowing into them were of great size, and heavily freighted with sediment, which was deposited in the still waters of the lakes, and thus was formed the rich loess deposits of Nebraska.

From several places in this loess have been taken rude stone arrows, buried at such depths and under such circumstances, that we must conclude they were deposited there when the loess was forming. But this requires us to carry them back to a time when elephants and mastodons roamed over the land, for bones of these huge creatures are quite frequently found. This arrow-point --or, it may be, spear-head--was found twenty feet from the surface; and almost directly above it, and distant only thirteen inches, was a vertebra of an elephant. "It appears, then, that some old races lived around the shores of this lake, and, paddling over it, accidentally dropped their arrows, or let them fly at a passing water-fowl;" and, from the near presence of the elephant's bone, it is shown that "man here, as well as in Europe, was the contemporary of the elephant, in at least a portion of the Missouri Valley.

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Illustration of Implement found in Loess.----------

Other examples are on record. In Greene County, Illinois, parties digging a well found, at the depth of seventy-two feet, a stone hatchet. Mr. McAdams carefully examined the well, to see if it could have dropped from near the surface. He tells us the well was dug through loess deposits; and from the top down was as smooth, and almost as hard, as a cemented cistern.
The loess was, as in Nebraska, deposited in the still waters of the lake which once occupied the Valley of the Illinois.
And we need not doubt but that it dates from the breaking up of the glacial ice. The position of this hatchet, then, found at the very bottom of the loess deposits, shows that, while yet the glaciers lingered in the north, and the flooded rivers spread out in great lakes, some tribes of stone-using folks hunted along the banks of the lakes, whose bottoms were to form the rich prairies of the West.

Previous to this discovery, Mr. Foster had recorded the finding in this same formation, distant but a few miles, a rude hatchet.

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There was in this case a possibility that the stone could have been shaped by natural means, and so he did not affirm this to be a work of man; but he says, "had it been recovered from a plowed field, I should have unhesitatingly said it was an Indian's hatchet." We think it but another instance of relics found under such circumstances, that it points to the presence of man at the close of the Glacial Age.

No doubt many similar discoveries have been made, but the specimens were regarded as the work of Indians; and though the position in which they wore found may have excited some surprise, they were not brought to the attention of the scholars. Nor is it only in the prairie regions of the West where such discoveries have been made. Col. C. C. Jones has recorded the finding of some flint implements in the drift of the Chattahooche River, which we think as conclusively proves the presence of man in a far away time as do any of the discoveries in the river gravels of Europe. It seems that gold exists in the sands of this river, and the early settlers were quick to take advantage of it. They dug canals in places to turn the river from its present channel--and others, to reach some buried channel of former times. These sections passed down to the hard slate rock, passing through the surface, and the

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underlying drift, composed of sand, gravel, and bowlders. "During one of these excavations, at a depth of nine feet below the surface, commingled with the gravels and bowlders of the drift, and just above the rocky substratum upon which the deposit rested, were found three [Paleolithic] flint implements."

He adds that, "in materials, manners of construction, and in general appearance, so nearly do they resemble some of the rough, so-called flint hatchets, belonging to the drift type, as described by M. Boucher De Perthes, that they might very readily be mistaken, the one for the other." "They are as emphatically drift implements, as any that have appeared in the diluvial matrix of France." On the surface soil, above the flints, are found the ordinary relics of the Indians. The works of the Mound Builders are also to be seen. Judging from their position, the Paleolithics must be greatly older than any of the surface remains. Many centuries must go by to account for the formation of the vegetable soil above them.

Speculating on their age, Mr. Jones eloquently says, "If we are ignorant of the time when the Chattahooche first sought a highway to the Gulf; if we know not the age of the artificial

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tumuli which still grace its banks; if we are uncertain when the red Nomads who, in fear and wonder, carried the burdens of the adventurous DeSoto, as he conducted his followers through primeval forests, and, by the sides of their softly mingling streams, first became dwellers here, how shall we answer the question as to the age in which these rude drift implements were fashioned and used by these primitive people?"

The examples we have quoted, even though the case of California be not considered, are all suggestive of a great antiquity for man, taking us back in time to when the glaciers still "shone in frigid splendor" over the northern part of the United States. When European savants had established the science of Archaeology, and shown the existence of separate stages of culture, it was but natural that those interested in the matter on this side of the Atlantic should turn with renewed energy to investigate the archaeology of this country, to see if here, too, they could find evidence of a Paleolithic Age. But the scholar in this country is confronted with a peculiar difficulty. Owing to the very multiplicity and variety of relics of prehistoric times, it is difficult to properly classify and understand them. The field is of great extent, the time of study has been short, and the explorers few; so it is not strange that

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but few localities have been thoroughly searched. But, until this is done, we can not hope to reach definite conclusions.

The peculiar culture of the Indians, prevailing among them at the time of the discovery, proved a hindrance, rather than a help, in this matter. The Indians are certainly not Paleolithic, many of their implements being finely wrought and polished; but their arrow-heads, hatchets, and celts were sufficiently rude to spread the conviction that all weapons and implements of stone should be referred to them. This belief has done much to hinder real progress. It is not to be wondered at that some difference of opinion has prevailed, among our scholars, whether the different stages of culture, discovered in Europe, have any existence here.

On one hand, it is denied that different stages can be detected. Says Prof. Whitney: "It is evident that there has been no unfolding of the intellectual faculties of the human race on this continent similar to that which has taken place in Central Europe. We can recognize no Paleolithic, Neolithic, Bronze, or Iron Ages." Others assure us, that if present, the ages stand in reverse order. "The relics last used were by far the rudest, and the historic races, which are the survivors of the

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prehistoric, are the wildest of the two; the lower status remaining, while the higher has passed away." In still another place we read: "The Neolithic and Bronze Ages preceded the Paleolithic, at least in the Mississippi basin."

Notwithstanding these quotations, we think it will yet be shown that in this country, as in Europe, there was a true Paleolithic Age, and that there was no such inversion as is here spoken of. In some places sedentary tribes may have been driven away and their territory occupied by more war-like, but less highly cultivated tribes. But take the whole Indian race, and they were steadily advancing through the Neolithic stage of culture. They were acquainted with copper, and were drawing near to the discovery of bronze and metals, and, indeed, the discovery had been made of bronze in the far south. But lying back of the true Indian Age, long preceding it in time, to which probably belong the relics mentioned in the preceding discoveries, is a true Paleolithic Age.

We are indebted for the facts on which the above conclusion rests more to the writings of Dr. C. C. Abbott, of Trenton, New Jersey, than any other individual, and his results are based on an extensive study of the relics themselves and the position in

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which found. In a collection of stone implements of this country arranged in a cabinet, we find rude and unpolished specimens, as well as those of a finely wrought Neolithic type. Now the Indians, when first discovered, frequently made use of very rudely formed implements, and from a knowledge of this fact, it came about that but little attention was paid to the position in which the relics were discovered. They were all classified as Indian relics. But the greatest and most valuable discoveries in science have occurred as a result of the attention paid to little things; in this case by carefully scrutinizing the position in which they occurred.

Dr. Abbott commenced by gathering a very extensive collection, carefully searching his section of country and gathering all specimens of artificially shaped stones. These must have existed there in considerable quantities, as, in three years' time, he collected over nine thousand specimens, carefully examining them as they came from the soil. As a result of this extensive and careful research he is able to present us some general conclusions. The surface specimens, including in this classification also those specimens turned up by the plow, are characteristically Indian. The material is jasper and quartz, and they are generally carefully made. They used other

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varieties of stone as well. Like the Neolithic people of Europe, they sought the best varieties of stone for their purpose. But his collection also included rude Paleolithic forms, and he found by taking the history of each specimen separately, that just in proportion as the relics were rude in manufacture and primitive in type the deeper were they buried in the soil. Writing in 1875, he says: "We have never met a jasper (flint) arrow-head in or below an undisturbed stratum of sand or gravel, and we have seldom met with a rude implement of the general character of European drift implements on the surface of the ground.

These are not theoretical opinions, but are deductions drawn from a very extensive experience. From figured specimens of these rudest formed implements, we see they are veritable Paleolithic forms, resembling in a remarkable manner the rude implements of the old world, whether collected in France or in India. We learned that the Paleolithic people of Europe utilized the easiest attainable stone for their implements. They contented themselves with such pieces of flint as they could gather in their immediate vicinity. The easiest attainable rock in the valley of the Delaware is not flint, but argillite, and such is the material of which the Paleolithic implements are

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formed. Thus it is shown that the first appearance of a stone-using folk in the valley of the Delaware was in the Paleolithic stage of their culture. Judging from the depths of their buried implements, this long preceded the Neolithic stage.

Illustration of Spear-shaped Paleolithic Implement.-----

These conclusions have been sustained in a very marked manner by late discoveries in the valley of the Delaware, to which we will now refer. After reaching the conclusion that the relics of the Stone Age in New Jersey clearly pointed to a Paleolithic beginning, when argillite, the most easily attainable stone, was utilized in the manufacture of weapons and implements, Dr. Abbott made the further discovery that in the ancient gravels of the Delaware River Paleolithic implements only were to be found. We must remember that it was in the gravels of European rivers that the first discoveries were made which have since resulted in so wonderfully extending our knowledge of the past of man.

The city of Trenton, New Jersey, is built on a gravel terrace whose surface is between forty and fifty feet above the flood

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plain of the Delaware. We are told that this gravel is clearly a river deposit, and must have been laid down by the Delaware at some former time in its history. It is in this gravel deposit that quite a large number of Paleolithic implements have been found.

Illustration of Paleolithic Implement, Argillite.--------

This cut is a representation of one of them, found under such circumstances that there can be no question about its antiquity. We are told it was taken from the face of the bluff fronting the river. Owing to heavy rains, a large section off of the front of the bluff became detached just the day before this specimen was discovered. It was found in the fresh surface thus exposed, twenty-one feet from the surface, almost at the bottom of the gravel. Immediately above it, and in contact with it, was a bowlder estimated to weigh over one hundred pounds. Immediately above this last was a second and much larger bowlder. It is manifest the implements could never have gotten in the place found after the gravel had been deposited.

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This is only one of the many examples that could be given. But it is to be noticed that implements of the Neolithic type do not occur in the gravel, except on the surface. Dr. Abbott is not the only one who has found those implements. Many of our best American scholars have visited the locality and secured specimens, amongst others, Prof. Boyd Dawkins, of England, who is so familiar with this class of relics in Europe. We may consider it proven, then, that in this country there was also a Paleolithic Age. Our present information in regard to it is only a beginning.

Since this interesting discovery was made in New Jersey we have received news of similar discoveries in Minnesota. A lady, Miss Frank Babbitt, has found in the modified drift of the Mississippi River, at Little Falls, Minnesota, evidence of the existence of Paleolithic man. The implements are made of quartz, and not argillite, but closely resemble implements made of this later material as described by Dr. Abbott. It is, to say the least, an interesting coincidence that one of a very few flint implements found in the Trenton gravel by Dr. Abbott should be identical in shape with some of the flint implements in Minnesota.

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This point being determined, others at once spring up asking solution. Among the very first is the question of age. The river terrace on which Trenton is built is a geological formation, and if we can determine its age we shall also determine at least one point in the antiquity of man, for we know the implements are as old as the gravels. It is not necessary for our purpose to give more than the results of the careful labors of others in this direction. We may be sure that this question has been carefully studied. When the implements were first discovered, the gravels were considered of glacial origin, and to that period they were assigned by Dr. Abbott. Subsequently Prof. Lewis, a member of the Pennsylvania State survey, decided that they were essentially post-glacial--that is, more recent in time than the Glacial Age. Still more recently Prof. Wright, of Oberlin, but also of the State survey of Pennsylvania, concludes that they are, after all, a deposit made at the very close of the Glacial Age.

He thinks the sequence of events were about as follows: When the ice of the Glacial Age reached its greatest development, and came to a pause in its southward march, it extended in an unbroken wall across the northern part of New Jersey, crossing the Delaware about sixty-five miles above Trenton. In front of

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it was accumulated the great terminal morain--a long range of gravelly hills still marking its former presence.

It is certain that the close of the Glacial Age was comparatively sudden, and marked by floods far exceeding any thing we are acquainted with at the present day. For, when the formation of the ice ceased, we must bear in mind that the country to the north of the terminal morain was covered with a great glacier, in some places exceeding a mile in thickness. When glacial conditions were passing away, and the ice commenced to melt faster than it was produced, the thaw would naturally go on over the entire field at an increasing rate, and hence would result floods in all the rivers.

He considers the gravels in question to have been deposited near the close of this flooded period, when the land stood at about its present level and the glaciers had retreated perhaps to the Catskill Mountains. The rivers were still swollen and would be heavily charged with coarse gravel brought from the morains and lying exposed on the surface of the ground vacated by the glaciers.

Probably but few geologists will take exceptions to these views.

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Thus we have very satisfactory reasons for connecting these Paleolithic people with the close of the Glacial Age--a conclusion to which the scattering discoveries mentioned in the preceding pages also points. But as regards Dr. Abbott's discoveries, they are on such a scale, and vouched for by so many eminent observers, that we need no longer hesitate to accept them, or complain of the scattering nature of the finds.

But we might inquire whether this is the earliest period to which the presence of man can be ascribed in this country? Excepting, of course, California, we do not know of any well established fact on which to base a greater antiquity for man. However, this subject is very far from being as closely studied as in Europe. Believing that in Europe man was living before the Glacial Age, and that in all probability he was living in California at the same early time, we would naturally expect to find some evidence of his presence in the Mississippi Basin and along the Atlantic seaboard. But no explorer has yet been fortunate enough to make such discoveries.

It is scarcely necessary to point out that we have only the relative age of these gravel deposits. We have not yet arrived at an answer in years. This we are not able to do. As we have

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several times remarked, our American scholars, as a rule, do not think many thousands of years have elapsed since the Glacial Age, and yet they are not all agreed on that point. From the depths in the gravel and loess deposits that the stone relics are found, we may suppose that man was present during the entire series of years their formation represents. Prof. Aughey, to whose discoveries in loess deposits in Nebraska we have referred, estimates the length of time necessary to produce those deposits as between nineteen and twenty thousand years, and this he considers a low estimate. So we see that, at any rate, the date of man's first appearance in America was certainly very far in the past.

In forming a mental picture of the conditions of life at that early time, it is not necessary to imagine a dreary scene of Arctic sterility. This is not true of the time when the Glacial Age was at its greatest severity. But at the time we are now considering, the glaciers had retreated over a large part of the country, though they still lingered in northern and mountainous regions. Great lakes and majestic rivers were the features of the country. The St. Lawrence was still choked with ice, and the great lakes must have discharged their waters southward. The Mississippi, gathering in one mighty stream the drainage of

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the Central Basin, sped onward to the Gulf, doubtless many times larger than its present representative. The animals then living included several species that have since become extinct. Mastodons and elephants must have been numerous, as their remains are frequently found in loess deposits. They have also been found in the gravels of New Jersey, in connection with the rude implements already mentioned. Probably keeping close to the retreating glaciers were such animals as the moose, reindeer, and musk-ox, while the walrus disported itself in the waters off the coast. At any rate those animals now only found in high northern latitudes were living during Glacial times as far south as Kentucky and New Jersey.

A good deal of interest is connected with the finding of one mastodon's tooth. It was found in the gravel deposit, about fourteen feet beneath the surface. It must have been washed to the position where found when the great floods from the melting glacier, with their burden of sand and gravel, were rolling down the valley. We can either conclude that the climate was such as to permit the existence of such animals, or that the animal to which it belonged lived in some far away pre-glacial time. But our interest suddenly increases when we learn that, but a few feet away, under exactly similar circumstances, was found

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the wisdom tooth of a human being. It, too, was rolled, scratched, and polished, and had evidently been swept along by the tumultuous flood. "The same agency that brought the one from the Upper Valley of the Delaware brought the other, and, after long years, they come again to light, and jointly testify that, in that undetermined long ago, the creatures to which they respectively belonged were living together in the valley of the river."

We must now consider the question of race. Who were the men that fashioned the implements? Were they Indians? or were they a different people? As far as we know the Indians, they were Neolithic. Their implements and weapons are often polished, pecked, and finely wrought; and, as before remarked, they employed the best kind of stone for their purpose. Dr. Abbott, who speaks from a very extensive personal experience, tells us, that it is not practical to trace any connection between the well-known Indian forms and the Paleolithic implements of the river gravels: "The wide gap that exists between a full series of each of the two forms is readily recognized when the two are brought together." Besides this difference in form, there is also a difference in material. The ruder forms not being of jasper and allied minerals, but are almost exclusively of

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argillite. In addition to the foregoing, we must consider the different positions they occupy--the former being found only on or near the surface, the latter deeply buried within. These different reasons all point to the same conclusion: that is, that the Indians were preceded in this country by some other people, who manufactured the Paleolithic specimens recently discovered.

In Europe, Prof. Dawkins, as we have seen, maintains that the Cave-men were the predecessors of the Eskimos. This may serve us as a point of departure in the inquiry as to who the pre-Indian people were? It is manifest, however, that we must have some ground on which to base this theory. The Eskimo seem to belong to the Arctic region, as naturally as the white bear and the walrus. At the early time we are considering in America, glaciers had not retreated very far. So his climatic surroundings must have been much the same as at present. But the Eskimo may not live where he does now by choice: we may behold in him a people driven from a fairer heritage, who found the ice-fields of the North more endurable than the savage enemy who envied him his possession. It seems very reasonable to suppose that the Eskimos long inhabited this country before the arrival of the Indians, if it was not, in fact, their original home.

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Mention has been made of the Eskimo traits still to be observed among the tribes of California. Prof. Putnam thinks that this fact can best be explained on the supposition that these tribes came in contact with primitive Eskimo people. Dr. Rink, from investigation of the language and traditions of the different Eskimo tribes, thinks they are of American origin, and must once have lived much farther south. He says, "The Eskimos appear to have been the last wave of an aboriginal American race, which has spread over the continent from more genial regions--following principally the rivers and water-courses, and continually yielding to the pressure of the tribes behind them until they have at last peopled the sea-coasts." Mr. Dall, in his explorations of the Aleutian Islands, comes to the same conclusion as Dr. Rink. He says his own conclusions are, "that the Eskimos were once inhabitants of the interior of North America--have much the same distribution as the walrus, namely, as far south as New Jersey."

All this tends to prove that the Paleolithic people of New Jersey were ancestors of the Eskimos. This becomes highly probable when we pursue the subject a little farther. Dr. Abbott has shown, from the similarity of implements, position in which

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found, and so forth, that the Paleolithic people continued to occupy the country down to comparatively recent times, when Indian relics took their place. This is such an important point that we must give his reasons more in detail.

Remember that Dr. Abbott speaks from the experience gained by gathering over twenty thousand specimens of stone implements, and paying especial attention to the position in which they were found. The surface soil of that section of New Jersey, where he made his explorations, was formed by the slow decomposition of vegetable and forest growth. In this layer he found great numbers of undoubted Indian implements. The number, however, rapidly decreases the deeper we go in this stratum. This would show that the Indians were late arrivals. Below this surface soil is a stratum of sand, overlying the gravelly beds below and passing into the surface soil just mentioned. In this layer were found great numbers of implements inferior to the Indian types found on the surface, but superior to the Paleolithic specimens described. They are not only inferior in finish to the Indian specimens, but are of different material. They are always formed of argillite. It was further noticed that the number of these rapidly decreased in the layer of surface soil, and are but rarely found on the surface.

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Now it might be said that these rude forms were fashioned by Indians when in a rude state of culture, and, as they became more advanced, they learned the superior qualities of flint, and so dropped the use of argillite. But it so happens that we have found several places where were veritable manufactories of Indian implements. It is very significant that we never find one where the workman used both flint and argillite. He always used flint alone. Every thing seems to point to the fact, that the tribes who fashioned the argillite implements were different from the Indian tribes who made the flint implements. It is Dr. Abbott's conclusions that the former, the descendants of the Paleolithic tribes, were the Eskimos, who, according to these views, must have inhabited the eastern portion of the United States to comparatively recent times.

In further support of these views, we think we have grounds for asserting that we have veritable historical accounts of the Eskimo people slowly retiring before the aggressions of their Indian foes. It is no longer doubted but that Norsemen, as early as the year 1000, made voyages of discovery along the coast of North America, as far south as Rhode Island: they called the country Vineland. It is true that the Icelandic accounts of these expeditions contain some foolish and improbable

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statements; but so do the writings of Cotton Mather, made many years later.

These accounts refer but very briefly to the inhabitants they saw, but enough is given to show that the people were not Indians, but Eskimos. The language used is: "The men were small of stature and fierce, having a bushy head of hair, and very great eyes, and wide cheeks." Their small size is frequently referred to, which would surely not be the case if they were describing the Algonkins that the English colonists found in the same section of country many years later. To the same effect is the assertion that the Eskimos did not reach Greenland until the middle of the fourteenth century. The traditions of the Tuscarawas Indians that place their arrival on the Atlantic coast in the year 1300, also refer to a tribe of people that were at least much like the Eskimos.

Thus we are led, step by step, to the recognition of a Paleolithic Age in America, and finally to the belief that the descendants of these people were Eskimos. We at once notice the coincidence of these results with some of the conclusions of Prof. Dawkins, of England, and it is desirable to trace a little farther the points of resemblance and difference between this

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age in America and in Europe. In this latter country we have seen the Paleolithic Age can be divided into two stages, or epochs, during which different races inhabited the country. The first, or the epoch of the men of the River Drift, long preceded the epoch of the Cave-men. It was those latter tribes only that Mr. Dawkins connects with the Eskimos.

We have not yet found evidence in this country that points to such a division of the Paleolithic Age. We have no relics of Cave-men as distinguished from the men of the River Drift. It is true, we are not lacking evidence of the use of caves by various tribes, but there is nothing to show that such use was very ancient, or that the people were properly Paleolithic. We can not say what future discoveries will unfold, but as yet we have only implements of the River Drift type, and these are the men Dr. Abbott considers to be the ancestors of the Eskimos. In this country, then, we have shown the existence of but one race of men in the same stage of culture as the men of the River Drift, but of the same race as the men of the Cave. These results may be cited as an argument in favor of those scholars who think that the men of the River Drift and the men of the Cave were in reality the same people.

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In Europe there was apparently a long lapse of time between the disappearance of the Paleolithic tribes and the arrival of the Neolithic people, but we have no evidence of such a period in America. The Paleolithic people remained in possession until driven away by the Neolithic ones. All evidence of Paleolithic man in Europe terminated with the Glacial Age, and there is little doubt but what they date from preglacial times.

Our present knowledge does not carry us any farther back in this country than the close of Glacial times. If we consider that the Glacial Age in America coincides in time with the same age in Europe, then the last statements would imply that the Paleolithic Age here was later than in Europe; in fact, that Paleolithic man had run his course in Europe before he appeared in America, and some might even go further, and say that he migrated from Europe to America. There are, however, no good grounds for such conclusions. We believe that future discoveries will show that in America also Paleolithic man was living in Glacial and preglacial times.

We feel that we have done but scant justice to this subject, but we assure our readers that this question has been but little studied in this country. Referring all relics of stone to the Indians, our scholars have been slow to recognize traces of an

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earlier race in America. Our sources of information are as yet but few, and much remains to be done in this field. In Europe as in America, scholars are still hard at work on the Paleolithic Age, and we are to hold ourselves in readiness to modify our opinions, or to reject them entirely and adopt new ones as our knowledge increases.

There is one thought that occurs to us. From the combined investigations of both European and American scholars, the Eskimo is seen to be one of the oldest (if not the oldest) races of men now living. They afford a striking illustration of the fact that a race may early reach a limit of culture beyond which, as a race, they can not pass. Should the American discoveries establish the fact that the River Drift tribes are also Eskimos, then we are fairly entitled to consider them the remnant of a people who once held possession of all the globe, but who have been driven to the inhospitable regions of the North by the pressure of later people. What changes have come over the earth since that early time? In the long lapse of years that have gone by newer races, advancing by slow degrees, have at last achieved civilization. The fiat of Omnipotent power could have created the world in a perfected form for the use of man, but instead of so doing, Infinite Wisdom allowed

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slow-acting causes, working through infinite years, to develop the globe from a nebulous mass. Man could, indeed, have been created a civilized being, but instead of this, his starting-point was certainly very low. He was granted capacities in virtue of which he has risen. We are not to say what the end shall be, but we think it yet far off.

Illustration of Stone Implement.----------

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(2) Dana's "Manual of Geology," p. 735, *et seq*.

(3) Ibid., p. 753.

(4) Whitney's "Geology of California," Vol. I.

(5) Whitney's "Geological Survey of California," Vol. I.

(6) Dr. Newbury's "Geological Survey of California."

(7) Whitney's "Auriferous Gravels of California," p. 283.

(8) Cambridge Lecture, 1878.

(9) Cambridge Lecture, 1878.

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(10) "Native Races," Vol. IV, p. 698.

(11) In general, all about Sonora, in the auriferous gravels, are found bones of extinct animals, and, associated with them, many relics of the works of human hands. These are found at various depths down to one hundred feet. (Whitney's "Auriferous Gravels," p. 263.)

(12) *American Journal of Science*, Vol. XIX, p. 176, 1880.

(13) "Auriferous Gravels," p. 279.

(14) Wright's "Studies in Science and Religion," p. 289.

(15) Dawkins, in Southall's "Pliocene Man," p. 18.

(16) Southall's "Pliocene Man," p. 19.

(17) Schoolcraft's "Archaeology," Vol. I, p. 105.

(18) As bearing on the question of Pliocene man, we might refer to the impression of human (?) foot-prints in the sand-stone quarry of the State prison at Nevada. At one time this area was the bottom of a lake, and we can plainly see the tracks of various animals that came down to drink. A huge mammoth visited the place; so also did horses and other animals. Among these is one series of tracks evidently made by a biped. Some think they are the sandaled foot of a human being. This question is still under discussion.

(19) "Geographical Survey West of the 100th Meridian," Vol. VII, p. 11.

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(20) Dana's "Manual of Geology," p. 583.

(21) Putnam, in "Geographical Survey West of the 100th Meridian," Vol. VII, p. 11.

(22) Ibid., p. 18.

(23) "Geographical Survey West of the 100th Meridian," Vol. VII, p. 12.

(24) "Prehistoric Times," p. 436.

(25) "Human Species," p. 147.

(26) The researches of Mr. Dall in the Aleutian Islands demonstrate the long-continued occupation of them by a savage people, and a gradual advance of the same in culture--though this apparent advance may have been simply the inroads of more advanced tribes. U.S. Geographical Survey W. of 100th M., p. 12.

(27) Wright's "Studies in Science and Religion," p. 292.

(28) Morgan's "Ancient Society," p. 108, note.

(29) "Geographical Survey West of the 100th Meridian," Vol. VII, p. 3.

(30) Bancroft's "Native Races," Vol. III, pp. 646, 647.

(31) "U.S. Geographical Survey West of the 100th Meridian," Vol. VII, p. 12.

(32) Dana's "Manual of Geology," p. 591.

(33) LeConte's "Elements of Geology."

(34) Prof. Winchell, in his last work, "World Life," p. 363,

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et seq., goes over the entire subject. As might be expected, no decisive results are obtained. He sums up the arguments to show that in this country the close of the Glacial Age is not more than seven thousand years ago (p. 375). The student who reads these pages and then Mr. Geikie's work, "Prehistoric Europe," will be sorely puzzled to know what conclusions to adopt. We can not do better than refer to the chapter on Antiquity Paleolithic Age.

(35) Dana's *Am. Journal of Science*, May, 1875.

(36) Foster's "Prehistoric Races," p. 62.

(37) See Lockwood, in *Popular Science Monthly* for 1883, for account of beaver dam built on a mastodon skeleton and evidence of contemporaneity of Indians and mastodons.

(38) "The Missouri was a stream thirty miles wide."

(39) "Hayden," p. 255.

(40) For the facts on which this paragraph rests, see Report of Samuel Aughey, Ph.D., in "U.S. Survey of the Territories, for 1874," p. 243, *et seq.*

(41) "American Assoc. Rep.," 1880, p. 720.

(42) "Illinois Geological Reports," Vol. III, p. 123.

(43) "Prehistoric Races," p. 69.

(44) Jones's "Antiquities of the Southern Indians," p. 293.

(45) Jones's "Antiquities of the Southern Indians," p. 295.

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(46) Quoted by Abbott's "Primitive Industry," p. 3.

(47) Peet's "Archaeology of Europe and America," p. 11.

(48) Short's "North Americans of Antiquity," p. 27.

(49) Up to the present time (1884) Dr. Abbott has collected over 20,000 specimens of stone implements, and all his more recent "finds" but confirm the opinion he expressed as to their significance ten years ago. His collection is at the Peabody Museum of Archaeology, at Cambridge, Mass. (See last Peabody Report.)

(50) "Nature," Vol. XI, p. 215.

(51) Ibid.

(52) "Nature," Vol. XI, p. 215.

(53) Ibid.

(54) "Primitive Industry," Abbott, p. 506.

(55) Seventeenth Report Peabody Museum, p. 354 and note.

(56) "Primitive Industry," p. 551.

(57) "Studies in Science and Religion," p. 324.

(58) Ibid., p. 324.

(59) We believe that similar results will attend the careful exploration in other sections. As bearing on this subject, it is interesting to know that Paleolithic implements are reported from one locality in Mexico. Our information in regard to them is very slight. (Brit. Assoc. Reports, 1881; Pres. Address,

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Count De Saporte, *Popular Science Monthly*, Sept., 1883.)

(60) Dana's "Manual of Geology," p. 540.

(61) "Geographical and Geological Survey," 1874, p. 254.

(62) Abbott's "Primitive Industry," p. 483.

(63) Abbott: "Proceedings of the Boston Society of Natural History," Vol. XXII, p. 102.

(64) "Primitive Industry," p. 512.

(65) "Primitive Industry," p. 512.

(66) U.S. survey West of the 100th Meridian," Vol. VII, p. 12.

(67) Abbott's "Primitive Industry," p. 520.

(68) Ibid., p. 519.

(69) U.S. Geographical Survey of the Rocky Mountain Region," Vol. I, p. 102, quoted from "Primitive Industry," p. 519.

(70) *Popular Science Monthly*, Jan., 1883.

(71) DeCosta's "Precolumbian Discovery of America," p. 69.

(72) Winchell's "Preadamites," p. 389.

(73) Brinton's "Myths of the New World," p. 23. Note.

(74) Prof. DeHass's "Paper" read before Am. Assoc., 1882.

(75) See chapter, "Cave-men," p. 113. Note.

(76) See remarks of Prof. Boyd Dawkins quoted earlier.

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END OF CHAPTER IX.**********

The Prehistoric World: or, Vanished Races

by E. A. Allen

Processed by D.R. Thompson

drthom@ihug.co.nz

Chapter X

THE MOUND BUILDERS.

Meaning of "Mound Builders"--Location of Mound Building tribes--
All Mounds not the work of men--Altar Mounds--Objects found on
the Altars--Altar Mounds possibly burial Mounds--Burial Mounds--
Mounds not the only Cemeteries of these tribes--Terraced Mounds

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--Cahokia Mound--Historical notice of a group of Mounds--The Etowah group--Signal Mounds--Effigy Mounds--How they represented different animals--Explanation of the Effigy Mounds--Effigy Mounds in other localities--Inclosures of the Scioto Valley--At Newark, Ohio--At Marietta, Ohio--Graded Ways--Fortified Inclosures--Ft. Ancient, Ohio--Inclosures of Northern Ohio--Works of unknown import--Ancient Canals in Missouri--Implements and Weapons of Stone--Their knowledge of Copper--Ancient mining --Ornamental pipes--Their knowledge of pottery--Of Agriculture--Government and Religion--Hard to distinguish them from the Indians.

The past of our race is irradiated here and there by the light of science sufficiently to enable us to form quite vivid conceptions of vanished peoples. As the naturalist, from the inspection of a single bone, is enabled to determine the animal from which it was derived, though there be no longer a living representative, so the archaeologist, by the aid of fragmentary remains, is able to tell us of manners and times now long since removed. In the words of another: "The scientist to-day passes up and down the valleys, and among the relics and bones of vanished people, and as he touches them with the magic wand of scientific induction, these ancient men stand upon their feet,

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revivified, rehabilitated, and proclaim with solemn voice the story of their nameless tribe or race, the contemporaneous animals, and physical appearance of the earth during those prehistoric ages."

We have already learned that the world is full of mysteries, and though, by the exertion of scholars, we begin to have a clearer idea of some topics, yet our information is after all but vague and shadowy. The amount of positive knowledge in regard to the mysterious tribes of the older Stone Age, or the barbarians of the Neolithic period, or the struggling civilization of the early Metallic Ages, is lamentably deficient. On our Western Continent we have the mysterious remains in the gold-bearing gravels of the Pacific coast, the significance of which is yet in dispute. We have the Paleolithic Age of Europe, represented by the remains found in the gravels of the Delaware at Trenton, New Jersey. When deposited there, and by what people used, is, perhaps, still enshrouded in doubt.

Leaving now the past, expressed by geological terms, or by periods of thousands of years, we draw near to our own tribes, near, at least, comparatively speaking, and behold, here, also, we discern evidence that an ancient culture, as marked as that

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which built its cities along the fertile water-courses of the Old World, had its seat on the banks of our great rivers; that here flourished in full vigor for an unknown length of time a people whose origin and fate are yet in doubt, though, thanks to the combined efforts of many able men, we begin to have clearer ideas of their social organization. We know them only by reason of their remains, and as these principally are mounds, we call them the "Mound Builders."

The name is not a distinguishing one in every sense, since mankind, the world over, have been mound and pyramid builders. The pyramids of Egypt and the mound-dotted surface of Europe and Asia bear testimony to this saying, yet nowhere else in the world are they more plainly divided into classes, or marked with design than here. In some places fortified hills and eminences suggest the citadel of a tribe or people. Again, embankments of earth, mostly circular or square, separate and in combination, generally inclosing one or more mounds, excite our curiosity, but fail to satisfy it. Are these fading embankments the boundaries of sacred inclosures, or the fortification of a camp, or the foundations on which to build communal houses? Here graded ways, there parallel embankments raise questions, but suggest no positive answer. We are equally in doubt as to

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the purposes for which many of the mounds were built. Some seem to have been used as places of sepulcher, some for religious rites, and others as foundation site of buildings. Some may have been used as signal mounds, from which warning columns of smoke, or flaming fires, gave notice of an enemy's approach.

Before coming to details let us, at a glance, examine the picture as a whole. This country of ours, with its wide plains, its flowing rivers and great lakes, is said by scholars to have been the home of a people well advanced in the arts of barbarian life. What connection, if any, existed between them and the Indians, is yet unsettled. We are certain that many years before the Spanish discovery of America they made their settlements here, developed their religious ideas, and erected their singular monuments. That they were not unacquainted with war, is shown by their numerous fortified inclosures. They possessed the elements of agriculture, and we doubt not were happy and contented in their homes. We are certain they held possession of the fairer portions of this country for many years.

We must now seek to gather more particular knowledge of them, and of the remains of their industry. We must not forget that these are the antiquities of our own country; that the broken

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archaeological fragments we pick up will, when put together, give us a knowledge of tribes that lived here when civilization was struggling into being in the East. It should be to us far more interesting than the history of the land of the Pharaohs, or of storied Greece. Yet, strange to say, the facts we have just mentioned are unknown to the mass of our people. Accustomed to regard this as the New World, they have turned their attention to Europe and the East when they would learn of prehistoric times. In a general way, we have regarded the Indians as a late arrival from Asia, and cared but little for their early history. It is only recently that we have become convinced of an extended, past in the history of this country, and it is only of late that able writers have brought to our attention the wonders of an ancient culture, and shown us the footprints of a vanished people.

We must first try and locate the territory occupied by the remains of the mound builders. They are not to be found broadcast over the whole country. We recall, in this connection, that the early civilization of the East arose in fertile river valleys. This is found to be everywhere the case, so we are not surprised to learn that the broad and fertile valley of the Mississippi, with its numerous tributaries, was the territory

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where these mysterious people reared their monuments and developed their barbarian culture. Throughout the greater portion of this area we find numerous evidences of a prolonged occupation of the country. We are amazed at the number and magnitude of the remains. Though this section has been under cultivation for many years, and the plow has been remorselessly driven over the ancient embankments, yet enough remain to excite our curiosity and to amply repay investigation.

This portion of the United States seems to have been the home, the seat of the mound building tribes. We can not expect to find one type of remains scattered over this entire section of country. Indeed, to judge from the difference of the remains, they must have been the work of different people or tribes, who were doubtless possessed of different degrees of culture. We will notice in our examination how these remains vary in different sections of the country. But it is noticeable that these remains become scarce and finally disappear as we go north, east, and west from the great valley. Although they are numerous in the Gulf States, yet they are not to be found, except in a few cases, in States bordering on the Atlantic. Some wandering bands, perhaps colonies from the main body of the people, established works on the Wateree River, in South

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Carolina, In the mountainous regions of North Carolina occur mines of mica, which article was much prized by the mound builders; and here also are to be found traces of their early presence. We do not know of any authentic remains in New England States. In Western New York there exists a class of remains which, though once supposed to be the work of these people, are now generally considered as the remains of works erected by the Indians, and of a similar origin appears to have been the singular fortification near Lake Winnipiseogee, in New Hampshire.

We have no record of their presence north of the great lakes. Passing now to the western part of the valley, we do not find definite traces of their presence in Texas. On this point, however, some authors state the contrary, apparently basing their views on a class of mounds mentioned by Prof. Forshey. But the very description given of these mounds, and the statements as to the immense number of them, seem to show they are not the work of men. We do not think the West, and especially the North-west, has been carefully enough explored to state where they begin. It is certain that the head waters of the Mississippi and the Missouri were thickly settled with tribes of this people, and some writers think that they spread

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over the country by way of the Missouri Valley from the North-west. Mr. Bancroft quotes from the writings of Mr. Dean, to show the existence of mounds and inclosures on Vancouver Island, and in British Columbia. And the statement is made that a hundred miles north of Victoria there is a group of mounds ranging from five to fifty yards in circumference, and from a few feet to fifty feet in height.

The inclosures, however, are described as being very similar to those in Western New York, and are probably simply fortified sites, common among rude people the world over, and such as were often erected by Indians. The remains on the upper Missouri and its tributaries are very numerous, and to judge from the brief description given us of them, they must be very interesting. This section has, however, been too little explored to speak with confidence of these works.

As showing how much care should be exercised in this matter, we refer to the account given by Capt. Wilkes in his journal of the United States exploring expedition. Speaking of the mounds on the gravelly plains between the Columbia River and Puget Sound, he tells us that the Butte Prairies are covered with small mounds at regular distances asunder. Some of them are thirty

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feet in diameter, six or seven feet above the level of the ground, and many thousands in number. He opened some of them, and found a pavement of round stones, and he thought he could detect an arrangement of the mounds in groups of five, thus.

Illustration of arrangement of mounds.---------

It was his impression that they were the works of men, and had been constructed successively and at intervals of several years. This observation of Capt. Wilkes is referred to by many as evidence of the former existence of Mound Builders in this section.

More careful research in recent times has established the fact that these mounds were certainly not erected by human hands, and no one else has been able to discover the supposed arrangement in groups of five. The pavement of round stones is common to the whole prairie.

But the greatest objection is the number of the mounds. A population larger than could have found a living in the

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country must have been required to erect them, unless we assume that a great length of time was consumed in this work.
Some other explanation must be given for these mounds, as well as for those mysterious ones mentioned by Prof. Forshey.
This cut gives us a fair idea of the scenery of this section and the mounds.

Illustration of Mound Prairie.----------

Within the area we have thus defined are located the works of the people we call the Mound Builders. What we wish to do is to learn all about these vanished people. A great many scholars have written about them, and large collections of the remains of their handiwork have been made. There is, however, a great diversity of opinion respecting the Mound Builders and their culture. So we see we have a difficult subject to treat of.
In order to gain a clear understanding of it, we must describe the remains more closely. About all we can learn of these people is from a study of their monuments. We can not call to our aid history or tradition, or rock-carved inscription, but must resort to crumbling mounds, broken down embankments; study their

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location, and observe their forms. To the studies in the field we must add those in the cabinet, and examine the many objects found in and above the mounds and earth-works, as well as the skeletons of the builders of the works. Rightly used, we can draw from these sources much valuable information of the people whose council-fires blazed all along the beautiful valleys of the Ohio and Mississippi rivers in times far removed from us.

Illustration of Mound and Circle.----------

We will first speak of the simplest form of these works, the ordinary conical mound. This is the one form found all over the extensive area designated. They exist in great numbers on the banks of the upper Missouri, as well as the river bottoms of the South. This cut represents a very fine specimen of a mound, in this instance surrounded by a circular embankment. We must not forget that mounds are found all over the world. "They are scattered over India, they dot the steppes of Siberia and the vast region north of the Black Sea; they line the shores of the Bosphorus and the Mediterranean; they are found in old Scandinavia, and are singularly numerous in the

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British Islands."

The principle in human nature which leads to the erection of mounds is living and active to-day. The shaft which surmounts Bunker Hill is but a modern way of memorizing an event which in earlier ages would have led to the erection of a mound, and the polished monument which marks the resting place of some distinguished man was raised for the same purpose as the mounds heaped over the chiefs and warriors of another age. The feeling which moves us to crown with steeples or spires our houses of worship is evidently akin to that which induced older races to erect a mound on which to place their temples, their idols, and altars of sacrifice.

If mounds were the only works remaining of these ancient people, we would not take so great an interest in them, and, as it is, we are not to suppose that all the mounds are the works of those people we call the Mound Builders. Recent investigation and historical evidence unite in showing that some comparatively recent Indian tribes formed and used mound structures. Early explorers have left abundant testimony to show that in many cases the Indians resorted to mound-burial. Thus, it seems that it was the custom of the Iroquois every eighth or tenth

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year, or whenever about to abandon a locality, to gather together the bones of their dead and rear over them a mound. To this custom, which was not confined to the Iroquois, are doubtless to be ascribed the barrows and bone mounds which have been found in such numbers in various parts of the country. Although it is well to bear these facts in mind, yet it is not doubted that the larger number, and especially the more massive ones, were erected by the same people who built the other mysterious works, and so it is necessary that they be carefully studied.

Illustration of Altar Mound.----------

In the valley of the Ohio there have been found a class of mounds known as Altar Mounds. These, it should be stated, nearly always occur in or near inclosures. This cut gives us a good idea of mounds of this kind. Near the top is seen an instance of what is called "intrusive" burial. After the mound was completed it had been dug into and a body buried near the surface. This burial was evidently later in time, and had no connection with the purpose for which the mound was originally built.

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We also notice in this mound the different layers of which it was composed. These layers are of gravel, earth, and sand, the latter being only a few inches thick. Mounds made in this manner are called stratified mounds, and all altar mounds are probably of this kind. The lines of stratification have been described as curving so as to correspond with the shape of the mound, and such we are told is the general rule.

Illustration of Plan and Section of Altar.---------

The peculiar feature, however, is the altar at the bottom of the mound, directly above the natural surface of the ground. The small cut gives us a clear idea of the altar, the light lines running around it showing the plan. These altars are almost always composed of clay, though some of stone have been discovered. They are of various shapes and sizes. We notice the dish-shaped depression on the top of the altar. The clay of which they are composed seems to have been moulded into shape directly over the surface of the ground. Sometimes a layer of sand was put down as a foundation. They are nearly always thoroughly burned, the clay being baked hard, sometimes to the

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depth of fifteen or twenty inches. This must have required intense and long continued heat.

We are at once curious to know the object of this altar. Within the basin-shaped depression are generally found all manner of remains. Sometimes portions of bones, or fragments of wood, arranged in regular order; pieces of pottery vessels, and implements of copper and stone; spear-heads, arrow-heads, and fragments of quartz and crystals of garnet. Pipes are a common find, carved in miniature figures of animals, birds, and reptiles. Two altar-mounds but recently examined near Cincinnati had altars about four feet square that were loaded down with ornaments.

One especially contained quantities of ornaments of stone, copper, mica, shells, the canine-teeth of bears and other animals, and thousands of pearls. They were nearly all perforated, as if for suspension. Several of the copper ornaments were covered with native silver which had been hammered out into thin sheets and folded over the copper. One small copper pendant seems to have been covered with a thin sheet of hammered gold, as a small piece was still clinging to it. This is the first example of finding native gold in the

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mounds. On this altar were also found masses of meteoric iron, and ornaments of the same material. One piece of mica showed the profile of a face.

In all cases the articles found on the altars show the action of fire. We seem justified, then, in supposing that after the altar was formed, fires were lit on them, and into this fire were thrown the various articles just enumerated. But what was all this for? This will probably never he very clear to us, beyond the fact that it was a religious rite. Portions of the human skeleton have been found on these altars, and it has been suggested that human victims were at times part of the sacrifice; but as it is known that this people practised cremation, it may be that the altars were sometimes used for that purpose, the remains being afterwards gathered and buried elsewhere.

After the offerings had been flung into the fire, while it was yet glowing on the altar, earth or sand was heaped over them for a few inches, then successive layers of earth and sand, or ashes, clay, or gravel. Sometimes the altars were used several different times, in which case a layer of clay several inches thick was laid over the old altar. In one case three layers had

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been burned in before the final addition of earth and sand were heaped over it. These strange monuments of a by-gone people hint to us of mysterious rites. We wish we had more positive knowledge of the ceremonies they commemorated; but at present we must rest satisfied with conjecture.

The next class of mounds are known as burial mounds, some of which are stratified, and resemble the so-called altar mounds. A mound explored in Butler County, Ohio, had in the center a layer of clay an inch thick, which had been burned until it was red. Underneath this was another layer of clay, beneath which was found charcoal, burnt cloth, and charred bones. Mr. Foster thinks that in this mound the body was placed on a rude altar, fires were lit, and that while yet burning, clay was thrown over it all, and that then fires were built all over the mound, sufficient to burn the clay for an inch in thickness.

We have also a description of a group of mounds explored near the Mississippi River, in which there were evident signs of cremation. At least in several mounds fires had been built close above the bodies. But in cremation other victims may have been burned to accompany the departed chiefs or warriors. In one mound evidence of such a custom was observed.

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In another mound the center was found to be a mass of burned clay interspersed with calcined human bones. No less than ten or fifteen bodies had been burned here. "They must have worshiped some fierce ideal deity, and the ceremony must have been considered of great importance to have required so many victims." This may have been, however, nothing more than simple cremation.

Pidgeon has described mounds in Minnesota, in many respects like the altar mounds. In one case he mentions there was an altar or pavement of stone on the original surface of the ground, a few feet above which was a layer of clay, showing the action of fierce and long-continued fires. We furthermore are told that cremation, especially of chiefs, was more or less common among the Village Indians of North America, that similar usage was observed among many of the tribes of Mexico, and that the Mayas, of Yucatan, burnt the bodies of their lords, and built temples over their remains. So it may be that the altar mounds are but varieties of funeral mounds, the remains of the bodies burned here being buried elsewhere.

Illustration of Burial Mounds.----------

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The nations that celebrated their mysteries around these mounds have long since departed; the altar fires long since burned low. We are not sure that we understand their purport, but we are certain they were regarded as of great importance, and we can readily imagine that when the fires were lit on the altars, gathering crowds stood round, and participated in the religious observance, throwing into the fire their most valued ornaments, in this manner paying their last respects to the departed chiefs and great men of their tribe.

The true burial mounds are very numerous, an comprise by far the larger number of mounds. They are to be found all over the Mound Builders' territory, and are about the only class of remains found in the prairie regions of the West. From the upper waters of the Missouri and the great lakes on the north to the Gulf States on the south, and from west of the Mississippi to the Alleghenies of the East, in all this vast region they are the prevailing class of remains, and occur by hundreds, and even thousands, along the valleys. The mounds themselves are often not very conspicuous; as a rule they are simply heaps of dirt raised above the surface and rounded over, and from two or three

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to fifteen or twenty feet high, although many are of much larger size. They are seldom found on the lower, or recent river terrace, but are common on the upper terrace, and are often built upon the high bluffs bordering the streams, where a wide stretch of country is exposed to view. Black-bird, an Omaha chief, who died about the year 1800, desired to be buried on a high bluff overlooking the Missouri, so that he might see the boats passing up and down the river. Perhaps from a similar superstitious wish the Mound Builders sometimes chose the sites of their burial mounds where they could watch over their country; or it may be that the monuments over the dead were placed in such conspicuous positions that they might be readily seen by the people.

The next cut represents an ordinary burial mound, which was explored by tunneling in from one side. We notice there are no different layers or stratifications in this case. In some cases, at least, the building of such a mound occupied several years. We can see where the dirt was thrown down in small quantities, averaging about a peck, as if from a basket. In one case grass had started to grow on the unfinished surface of the mound, to be covered up by fresh dirt.

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Illustration of Burial Mounds.----------

In the majority of cases the mounds contain the remains of but one individual, with various relics of a rude and barbarous people. Where but one body was buried, the usual mode of procedure seems to have been to first clear a space on the surface of the ground; the body was then placed in the center of this prepared place, and often a rude framework of timber was placed around it, sometimes a stone chamber was built up. Over this the mound was erected to the desired height. This description would apply to nearly all of the many thousands of burial mounds in the country.

In the cut a layer of charcoal is noticed near the top. Nearly all mounds show evidence of the existence of fire during some period of their construction. In some cases these fires were fierce and long continued, as if the object had been to cremate the body. It may have been a part of their religious belief that it was necessary to keep fires blazing on the mound for a short length of time to keep off evil spirits, or to comfort the soul of the departed. Such at any rate was the

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custom among some Indian tribes. We are told that among the Iroquois, a "fire was built upon the grave at night to enable the spirit to prepare its food."

In some cases, many individuals were buried in the same mound. These may be communal burials, such as we have already referred to. Mounds of this kind have been examined near Nashville, Tennessee. One mound alone was the burial place of over two hundred persons. Pidgeon describes some triangular burial mounds in Minnesota, differing in shape only from the ordinary circular mounds that belong to this division. In general, burial mounds are not very high, yet there are exceptions to this rule.

Illustration of Grave Creek Mound.----------

This cut represents one of the largest of these mounds. It is situated at the junction of Grave Creek and the Ohio River, twelve miles below Wheeling, in West Virginia. It measures seventy feet in height, and its base is nearly one thousand feet in circumference. An excavation made from the top downward, and from one side of the base to the center, disclosed the fact that

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the mound contained two sepulchral chambers, one at the base and one near the center of the mound. These chambers had been constructed of logs, and covered with stone. The lower chamber contained two skeletons, one of which is supposed to have been a female. The upper chamber contained but one skeleton.
In addition to these, there were found a great number of shell beads, ornaments of mica, and bracelets of copper.

A moment's thought will show us what a great work such a mound must have been for a people destitute of metallic tools and domestic animals. The earth for its construction was probably scraped up from the surface and brought thither in baskets.
A people capable of erecting such a monument as this, with only such scanty means at their command, must have possessed those qualities which would sooner or later have brought them civilization.

Another very interesting mound of this class once stood in the city of St. Louis. The rapidly growing city demanded its removal in 1869. It was an oblong mound, one hundred and fifty feet long by thirty in height. In its removal it was shown that it contained a burial chamber seventy-five feet long, from eight to twelve feet wide, and from eight to ten feet high, in which

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about thirty burials had taken place. The surface of the ground had first been leveled, then the walls raised to the desired height, made firm and solid, and plastered with clay. Timbers formed the roof, over which the mound had been raised to the desired height.

Illustration of Cross-section St. Louis Mound.--------

In process of time the roof decayed and fell in, thus giving a sunken appearance to the top of the mound. This view is a cross section of the mound as it was revealed by the workmen. We notice where the roof has fallen in, and the outline of the interior chamber. This burial chamber was perhaps an exact model of the cabins in which the people lived. Can it be that this mound was the final resting place of some renowned chief, and that the other bodies were those of his attendants sent to accompany him to the other world? This is perhaps as reasonable a conjecture as any. Certain it is that this tumulus and that at Grave Creek were fit pyramids for the Pharaohs of the New World.

It is not to be supposed that the mounds were the sole

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cemeteries of the people who built them. Like the barrows of Europe, they were probably erected only over the bodies of the chiefs and priests, the wise men, and warriors of the tribe. The amount of work required for the erection of a mound was too great to provide one for every person. The greater number of the dead were deposited elsewhere than in mounds, but it is doubtful whether we can always distinguish the prehistoric burial places from those of the later Indians. An ancient cemetery, discovered near Madisonville, Ohio, proved to be a most interesting find, as it was thought to be a burial place of the Mound Builders, but it seems there is strong doubt on this point. One writer thinks this was a cemetery of the Erie tribe of Indians, and not very ancient in date.

In Tennessee are to be found numerous burial places known as the stone-grave cemeteries. Stone graves of a similar character are found in Kentucky, Ohio, and Missouri. These are as yet but few facts which can be used as indicating that all the stone graves are of one people. Many of these cemeteries are of great antiquity, while similar stone graves are of quite recent date. In some places the cemeteries cover very large areas.

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Illustration of Terraced Mound.----------

We have now to describe a class of mounds that are always regarded with great interest, as a number of our scholars think they see in them the connecting link between the remains in this country and those of Mexico and the South. These are generally known as "temple mounds," from the common impression that they were sites of temples or public buildings. In general terms, mounds of this class are distinguished by their large size and regularity of form, and they always have a flat or level top. On one side there is generally a graded way leading up to the summit, in some instances several such methods of approach. Sometimes the sides of the mound are terraced off into separate stages.

We have already noticed that different sections of country are distinguished by different classes of mound remains. In the present State of Ohio are found many altar mounds and inclosures. In the West are large numbers of burial mounds, but the so-called temple mounds are most numerous in the South. At one place in Wisconsin is found a low embankment inclosing four low mounds with leveled tops. But the resemblance between

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these and the regular temple mounds is certainly slight. Only a few instances of these flat-topped mounds are found in Ohio. Of these the still existing "elevated squares" at Marietta are good examples.

Illustration of Elevated Square, Marietta.----------

This cut represents the mound preserved in the park at Marietta. It is ten feet high, one hundred and eighty-eight feet long, by one hundred and thirty-two feet wide. The platform on the top has an area of about half an acre. Graded ways lead up on each of the four sides. These grades are twenty-five feet wide, and sixty feet long.

As we approach the Gulf States, these platform mounds increase in number. The best representative of this class, the most stupendous example of mound builders' work in this country, is situated in Illinois, not far from St. Louis. The mound and its surroundings are so interesting that they deserve special mention. One of the most fertile sections of Illinois is that extending along the Mississippi from the Kaskaskia to the

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Cahokia river, about eighty miles in length, and five in breadth. Well watered, and not often overflowed by the Mississippi, it is such a fertile and valuable tract that it has received the name of the "Great American Bottom." It is well known that the Mound Builders chose the most fertile spots for their settlements, and it is therefore not surprising to find the evidence that this was a thickly settled portion of their territory. Mr. Breckenridge, writing in 1811, says: "The great number of mounds, and the astonishing quantity of human bones, everywhere dug up or found on the surface of the ground, with a thousand other appearances, announces that this valley was at one time filled with habitations and villages. The whole face of the bluff, or hill, which bounds it on the east, appears to have been a continuous burying ground."

Mounds are numerous in this section. We learn that there are two groups of mounds or pyramids, one about ten miles above the Cahokia, and the other about the same distance below it, more than one hundred and fifty in all. Speaking of the group above the Cahokia, Mr. Breckenridge says: "I found myself in the midst of a group of mounds mostly of a circular shape, and, at a distance, resembling enormous hay-stacks scattered through a meadow. One of the largest which I ascended was about two

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hundred paces in circumference at the bottom, the form nearly square, though it had evidently undergone considerable alteration from the washing of rains. The top was level, with an area sufficient to contain several hundred men." He represents the view from the top of the mound to be a very extensive and beautiful one. From this elevation he counted forty-five mounds or pyramids, besides a great number of small artificial elevations. This group was arranged in the form of a semicircle, about a mile in extent, the open space being on the river.

Illustration of Cahokia Mound.----------

Three miles above occurs the group in which is found the famous big mound. This cut gives us a good idea of the mound as it was in its perfect state. All accounts given of this mound vary. From a cut of the model, as prepared by Dr. Patrick, the area of the base is a trifle over fifteen acres. The ascent was probably on the south side of the mound, where the little projection is seen. The first platform is reached at the height of about fifty feet. This platform has an area of not far from two and four-fifth acres. Large enough for quite a number of

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houses, if such was the purpose for which this mound was erected. The second platform is reached at about the height of seventy-five feet, and contains about one and three-fourth acres. The third platform is elevated ninety-six or ninety-seven feet, while the last one is not far from one hundred feet above the plain. The area of the last two is about three-fourths of an acre each. The areas of all the platforms are not far from six acres. We require to dwell on these facts a moment before we realize what a stupendous piece of work this is. The base is larger than that of the Great Pyramid, and we must not lose sight of the fact that the earth for its construction was scraped up and brought thither without the aid of metallic tools or beasts of burden, and yet the earth was obtained somewhere and piled up over an area of fifteen acres in one place to a height of one hundred feet, and even the lowest platform is fifty feet above the plain. Some have suggested that it might be partly a natural elevation. There seems to be, however, no good reason for such suggestions.

What motive induced the people to expend so much labor on this mound? It is not probable that this was a burial mound, though it may ultimately prove to be so. The most probable supposition is that the mound was erected so as to secure an elevated site,

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perhaps for purpose of defense, as on these platforms there was abundant room for a large village, and an elevation or height has always been an important factor in defenses. In this connection, Prof. Putnam has called our attention to a fact which indicates that a very long time was occupied in the construction of the mound, and further, that a numerous population had utilized its platforms as house sites--that is, that "everywhere in the gullies, and over the broken surface of the mounds, mixed with the earth of which it is composed, are quantities of broken vessels of clay, flint chips, arrow-heads, charcoal, bones of animals, etc., apparently the refuse of a numerous people." The majority of writers, however, think that this elevated site, obtained as the result of so much labor, was utilized for important public buildings, presumedly the temple of their gods, and no one can help noticing the similarity between this structure and those raised by the ancient Mexicans for both religious purposes and town sites.

Mr. Foster thinks that "upon this platform was reared a capacious temple, within whose walls the high-priests gathered from different quarters at stated seasons, celebrated their mystic rites, while the swarming multitudes below looked up with mute adoration. Mr. Breckenridge, whose writings we have

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already referred to, at the time of his first visit, "everywhere observed a great number of small elevations of earth, to the height of a few feet, at regular distances apart, which appeared to observe some order: near them pieces of flint and fragments of earthen vessels." From this he concludes that here was a populous town, and that this mound was a temple site. It is doubtful whether we shall ever pierce the veil that lies between us and this aboriginal structure. The pyramids of the Old World have yielded up their secret, and we behold in them the tombs of Egypt's kings. But this earthen pyramid on the western prairie is more involved in mystery, and we do not know even its builders. If the result of religious zeal, we may be sure that a religion which exacted from its votaries the erection of such a stupendous piece of work was one of great power.

As before remarked, "temple mounds" increase in numbers and importance as we go south. "In Kentucky they are more frequent than in the States north of the Ohio River, and in Tennessee and Mississippi they are still more abundant. We also learn that they are often surrounded, or nearly so, with moats or ditches, as if to fortify their location. Our next cut illustrates such an arrangement--a circular wall of earth four feet high and two thousand three hundred feet in circumference, incloses four

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mounds, two of which are temple mounds. According to the late Prof. Forshey, temple mounds abound in Louisiana. He described a group situated in Catahoola County, in which the principal mound has a base of more than an acre, a height of forty-two feet, and the upper platform an area of nearly one-third of an acre. The smaller mounds are arranged around this larger one. This group is defended by an embankment. From this point for a distance of twenty miles along the river, are scattered similar groups of mounds; in all cases the smaller ones arranged around the larger one, which is presumably the site of a temple.

Illustration of Temple Mounds inclosed in a Circle.------

A digression right here may not be devoid of interest. We are not sure but that the dim, uncertain light of history falls on the origin of this group of mounds. When the French first commenced their settlement in the lower Mississippi Valley, the Natchez Indians was the most powerful tribe in all that section. In the course of time, wars ensued between them and the French, and in the year 1730 they fled into Upper Louisiana, and settled at the place where these mounds are now found. But the French

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followed them a year or so afterwards, and nearly exterminated. them. Some of our scholars think that they erected these mounds. The historian of that epoch simply says they had "built a fort there." It is however questioned whether they had time to build works of such magnitude. But they were both a mound-building and a mound-using people, and we are not prepared to say how long it would take them to do the work, until we know the number engaged, methods employed, and other considerations. If they did not build these works, they doubtless cleared them of trees and utilized them; and this place was therefore the scene of the final downfall of the Natchez--a people we have every reason to regard as intimately connected with the prehistoric mound-building tribes.

The largest temple mound in the South is near Seltzertown, Mississippi. Its base covers about six acres, and it rises forty feet. This slope was ascended by means of a graded way. The summit platform has an extent of nearly four acres. On this platform three other mounds had been reared--one at each end, and a third in the center. Recent investigation by the Bureau of Ethnology have shown that the base of this mound is a natural formation. Lumps of sun-dried, or partially burnt clay, used as plastering on the houses of the Mound Builders, gave rise to a

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sensational account of a wall of sun-dried bricks two feet thick, supporting the mound on the northern side. The famous Messier Mound, in Georgia, is said to reach a height of ninety-five feet. But a large part of this elevation is a natural eminence; the artificial part is only a little over fifty feet.

Illustration of Etowah Mound, Georgia.----------

A work of unusual interest occurs on the Etowah River, Georgia. This cut gives us a plan of the work. We notice, first of all, the moat or ditch by which they fortified their position. The ditch is still from five to twenty-five feet deep, and from twenty to seventy-five feet wide. It connects directly with the river at one end, but stops short at the other. It surrounds nearly fifty acres of land. At two points we notice reservoirs, each about an acre in size, and an average depth of not less than twenty feet. At its upper end is an artificial pond. This ditch, with its reservoirs and pond, is no slight work. The large mound seen in the center of the space is one of the largest of the temple mounds. Its shape is sufficiently shown in

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the cut. The height of the mound is sixty-five feet. We call especial attention to the series of terraces leading up the south side of the mound. Graded ways afford means of access from one terrace to the other. A pathway is also seen on the eastern side.

To this group of works an interest attaches similar to that of the group of works mentioned in Louisiana. We are not certain but that we catch a glimpse of it while it was yet an inhabited Indian town. This is contained in the brief accounts we have of the wanderings of the unfortunate De Soto and his command. One of the chroniclers of this expedition La Vega, describes one of the towns where the weary Spaniards rested, and which we are sure was somewhere in Northern Georgia, in such terms, mentioning the graded way leading to the top, that Prof. Thomas, who has spent some time in this investigation, thinks his description can apply only to the mound under consideration. Whether this conclusion will be allowed to stand, remains to be seen. But, if true, then the darkness which rests upon this aboriginal structure lifts for a moment and we see around it a populous Indian town, able to send five hundred warriors to battle. The Spaniards marched on to sufferings and death, and darkness again closed around the Etowah Mound. When the

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Europeans next beheld it around it was the silent wilderness;
the warriors had departed; the trees of the forest
overspread it.

We have now described the principal mound structures, and shown the different classes into which they are divided. But a large class of mounds are found scattered all through the Mound Builders' territory that were probably used as signal mounds. Burial mounds were also often used for this purpose. This was because their location was always very favorable for signal purposes. Signaling by fire is a very ancient custom. The Indians on our western plains convey intelligence by this means at the present day. Some tribes use such materials as will cause different shades of smoke, using dried grass for the lightest, pine leaves for the darkest, and a mixture for intermediate purposes. They also vary the signal by letting the smoke rise in an unbroken column, or cover the fire with a blanket, so as to cause puffs of smoke. The evidence gathered from the position of the mounds, and traces of fire on their summit, is that the Mound Builders had a very extensive system of signal mounds.

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Illustration of Hill Mounds.----------

To illustrate this system, we would state that the city of Newark, Ohio, was the site of a very extensive settlement of the Mound Builders. This settlement was in a valley, but on all the surrounding hills were located signal mounds. And it is further stated that lines of signal mounds can be traced from here as a center to other and more distant points. The large mound at Mt. Vernon, twenty miles to the north, was part of this system. As the settlements of the Mound Builders were mostly in river valleys, we would expect to find all along on the bluffs fronting these valleys traces of signal mounds. In the Scioto Valley, from Columbus to Chillicothe, a distance of about forty miles, twenty mounds "may be selected, so placed in respect to each other that it is believed, if the country was cleared of forests, signals of fire might be transmitted in a few minutes along the whole line." Some think the chain is much more extensive than this, and that the whole Scioto Valley, from Delaware County to Portsmouth, was so provided with mounds that signals could be sent in a very few minutes the whole distance.

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Illustration of Miamisburg Mound.----------

The valley of the Miami River was equally well provided with signal mounds. This great mound, at Miamisburg, Ohio, rising to the height of sixty-eight feet, was one of the chain by which signals were transmitted along the valley. Not only was each river valley thus provided, but there is evidence that communication was established between different river systems, so we can easily see how quickly the invasion of their country by an enemy from any quarter would become known in widely scattered sections. Immediately across the river from Chillicothe, Ohio, on a hill nearly six hundred feet high, was located a signal mound. A fire built upon it would be visible twenty miles up the valley, and an equal distance down. It would be also visible far down the valley of Paint Creek. Some think that such a system of lofty observatories extended across the whole State of Ohio, of Indiana, and Illinois, the Grave Creek mound, on the east, the great mound at Cahokia, on the west, and the works in Ohio filling up the line. We do not believe, however, it is safe to draw such conclusions. It is doubtful whether there was any very close connection between the tribes

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in these several sections.

In the State of Wisconsin are found some of the most interesting remains of the Mound Builders. They are so different from the ordinary remains found elsewhere that we must admit that the people who built them differed greatly from the tribes who built the great temple mounds of the South, or the earthworks of Ohio. The remains in Wisconsin are distinguished not by their great size or height, but by their singular forms. Here the mound building instincts of the people were expressed by heaping up the earth in the shape of animals. What strange fancy it was that led them to mould the figures on the bluffy banks of the rivers and the high lands about the lakes of their country, we shall perhaps never know. That they had some design in this matter is, of course, evident, and if we would try and learn their secret, we must address ourselves to a study of the remains.

Effigy mounds are almost exclusively confined to the State of Wisconsin. We, indeed, find effigy mounds in other sections, but they are of rare occurrence. They, however, show that the same reasons, religious, or otherwise, exists in other localities, while in the area covered by the southern portion of

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the State of Wisconsin it found its greatest expression.

This cut affords us a fair idea of effigy mounds. Here are seen two animals, one behind the other. On paper we can readily see the resemblance. Stretched out on the ground, and of gigantic proportions, the resemblance is not so marked, and some might fail to notice it at first sight. Either of those figures is over one hundred feet long, and about fifteen feet wide.

With few exceptions, effigy mounds are inconsiderable in height, varying from one to four feet. These mounds have been carefully studied of late years, and there is no doubt that in many instances we can distinguish the animals represented.

Illustration of Effigy Mounds.----------

We learn, then, that tribes formerly living in Wisconsin had the custom of heaping up the earth in the shape of the various animals peculiar to that section. But no effigies are found of animals that have since become extinct, or of animals that are to be found only in other lands.

Our next cut represents the famous elephant mound of Wisconsin, on the strength of which a number of fair theories have been

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given relating to the knowledge of the mastodon by the builders of the mound, and its consequent antiquity. It now bears some resemblance to an elephant, but we learn that the trunk was probably produced by the washing of the banks and, from the same cause, a projection above the head, supposed to represent horns, has disappeared. Taking these facts into consideration, it is quite as likely that it represented a buffalo.

One writer even thinks he found a representation of a camel, but the fact is, the more these effigy mounds are studied, the more certain are we that they are representations of animals formerly common in that region.

Illustration of Elephant Mound and Emblematic Mounds.--------

The manner in which they represented the various animals is full of interest to us. It has been discovered that they worked on a system. The last cut represents a group of three animals discovered a few miles from the Blue Mounds in Dane County. We notice at once a difference between the central animal, with a tail, and the other two. It will also be observed that the animals are represented in profile, with only two projections

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for legs. They are never separated so that we can distinguish the two front and the two hind feet. Animals so figured are the bear, fox, wolf, panther, and others. Grazing animals, such as the buffalo, elk, and deer, are represented with a projection for horns. In the last cut the other two animals are buffaloes. In various ways the particular kind of animal can nearly always be distinguished.

Illustration of Grazing Elks. Fox in the distance.------

The preceding cut represents two elks grazing, and a fox in the distance. The long embankments of earth at one side are considered by Mr. Peet as in the nature of game drives. But we call attention to the expressiveness with which these figures are delineated. What could be more natural than the quietly grazing elks, with the suspicious prowling fox in the distance. In the cut we also see two cross-shaped figures. This was their method of representing birds, a projection on each side of a central body denoting wings. These figures are often very expressive.

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Illustration of Eagle Mound.----------

In this cut we have no difficulty in recognizing an eagle. It is represented as soaring high in the air. On the bluffs above it is a wolf effigy, and several conical and long mounds. In the cut preceding this the eagle and the hawk are hovering over the feeding elks, while in this cut a flock of hawks are watching some buffaloes feeding in the distance. This group of effigies was found on the banks of the Kickapoo River.

Illustration of Hawks and Buffaloes.----------

Our next cut represents a wild goose with a long neck and beak followed by a duck with a short neck, flying towards the lake.

Illustrations of Goose and Duck.----------

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Water-loving animals, such as salamanders and turtles, are represented in still another way, two projections on each side of a central figure. The next following cut represents a turtle. The tail was not always added. The salamander closely resembles the turtle, but notice the difference in the body, and still different is the cut of the musk-rat (see later). Fishes are figured as a straight embankment of earth tapering to a point.

Illustration of Turtle.----------

The same system that was observed in the location of signal mounds is to be noticed in the arrangements of these groups of effigy mounds. They are not alone. One group answers to another on a distant hill, or is in plain view of another group in the valley below. Distant groups were so related, each commanding a wide extent of country, and thus group answers to group, and mound to mound, for miles away, making a complete system throughout the region.

Illustration of Salamander and Musk-rat.---------

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We notice this as to the location of the mounds. When we examine the mounds themselves we observe no little skill in the way they represent the animals. They often impressed on them something more than mere animal resemblances. "There are groups where the attitudes are expressive of a varied action. Certain animals, like the weasel or mink, being seen with a bird so near that, apparently, it might be caught by a single spring; and still others, like the wolf or wild-cat, are arranged head to head, as if prepared for combat; and still others, like the squirrel or coon, are in the more playful attitudes, sometimes apparently chasing one another over hill or valley; and again situated alone, as if they had just leaped from some tree, or drawn themselves out of some den or hole."

Illustration Man-shaped Mound.----------

Nor is the effigy of the human form wanting. It is found in several localities throughout the State. This cut shows us one such effigy. This was the beginning of a long train of animal

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mounds, presumably representing bears, found near the Blue Mounds, Wisconsin. We can not observe that any more importance was ascribed to the effigy of a human being than to that of an animal.

In casting about for suitable explanation for the erection of these animal mounds, we find ourselves lost in conjecture as to the motive which induced these people to prepare these earthen effigies. We may be sure that it was for some other reason than for amusement, or to give exercise to an artistic feeling. Only in very few instances do we detect any arrangements which would imply that they were in the nature of defenses. In some cases the effigies are so arranged as to form a sort of inclosure, some portion of the figure being prolonged to an unusual extent and thus inclosing a space that may have been utilized for a village site. This group on the Wisconsin River illustrates this point. Here the area thus partially inclosed, is about an acre. It is a singular fact that these inclosures are almost always triangular in shape. But it is manifest that a simple earth wall would serve for defense much better than these forms. They probably were not burial mounds, as few contain human remains, and it is not yet certain that these remains were not intrusive burials. It seems, therefore that

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they must have been in some manner connected with the religious life of the people.

Illustration of Emblematic Mound Inclosure.--------

If we examine the various groups scattered throughout the State, this belief is strengthened. It is found, for instance, in nearly every group, that some one effigy is the principal one, and is placed in a commanding position, about which the other forms are arranged. It is also thought that the same effigy is the principal or ruling effigy over a wide district.
In illustration of this, it can be stated that in the south-eastern part of the State the turtle is always the ruling effigy. In any group of effigies it is the principal one.
It seems to watch over and protect the others. In subordination to it are such forms as the lizard, hawk, and pigeon. Passing to the North, the turtle is no longer the important figure. It is replaced by the wolf, or wild-cat. This is now the principal form, and if the turtle is sometimes present, it is of less importance.

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So marked is the fact we have just stated that Mr. Peet says, "that sometimes this division assumes almost the character of a river system, and thus we might trace what seems to be the beginning in this country of that which prevailed on classic soil and in Oriental regions--namely, river gods and tutelar divinities of certain regions, each tribal divinity having its own province, over which it ruled and on which it left its own form or figure as the seal of its power and the emblem of its worship."

Looking for some explanation of this, we may find a key in the known customs of various Indian tribes, and the lower races of men. It is known that a tribe of Indians is divided into smaller bands, which are called gens or clans. A gens may consist of several hundred persons, but it is the unit of organization. It takes the place of a family among civilized people. These various bands are generally named after some animal. In the beginning these names may have been of no special significance, but in course of time each band would come to regard themselves as descendants of the animal whose name they bore. Hence the animal itself would be considered sacred in their eyes, and its life would seldom be taken by members of that gens.

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The animal thus honored by the gens was, in the Indian dialect, the totem of the clan. This organization and custom we find running all through the Indian tribes. In many tribes the Indians were wont to carve a figure of their totem on a piece of slate, or even to carve a stone in the shape of the totem, which carved or sculptured stone they wore as an ornament, or carried as a charm to ward off evil and bring them good luck.
We need only suppose that this system was very fully developed among the Mound Builders of Wisconsin, to see what important bearing it has on these effigy mounds.

A tribe located on one of the fertile river valleys of Wisconsin was composed of various gens or clans. On some common point in proximity to their villages, or some spot which commanded a wide view of the surrounding country, each gens would rear an effigy of its totem, the animal sacred to them. In every tribe some gens would be the most powerful, or for some cause the most respected, and its totem would be given in the largest effigy, and would be placed in the most commanding position. In a different locality some other tribe would be located, and some other totem would be regarded as of the most importance.

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In this light effigy-mounds are not mere representatives of animal forms. They are picture-writings on a gigantic scale, and are the source of much true history. They tell us of different tribes, the clans which composed them, the religious beliefs, and the ruling gens of the tribe. Contemplating them, we seem to live again in the far-off past. The white man disappears; waving forests claim their ancient domain, and the rivers, with a more powerful current, roll in their olden channels. The animals whose forms are imaged here, go trooping through the forest or over the fertile bottom lands. The busy scenes of civilization give place to the placid quiet of primeval times, and we seem to see peaceful tribes of Mound Builders paying a rude veneration to their effigy-gods, where now are churches of a more soul-satisfying religion.

But there is still another point to be learned from an examination of these ancient mounds. Not only are they totems of the tribes, but they were looked on in some sense as being guardian divinities, with power to protect the homes of the tribe. This is learned by studying the location in which they are placed. They occupy all points of observation. In other parts of the Mound Builders' country, wherever we find signal-mounds we find corresponding positions in Wisconsin

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occupied by groups of effigy-mounds, or if one only is present, it is always the one which, from the considerations we have stated, was regarded as the ruling effigy of that section. It is as if their builders placed them as sentinels to guard the approaches to their homes, to give warning of the arrival of hostile bands. This is further borne out by finding that mounds placed in such positions frequently show evidence of the action of intense fire, and so we conclude they were used as signal stations also. So we need not doubt but that the region thus watched over by these effigy-mounds, group answering to group along the river banks, or in the valleys below, was at times lit up by the signal fires at night; or the warning column of smoke by day betokening the presence of dancer.

Illustration of Bird Mound, surrounded by a Stone Circle.---

Before leaving the subject of effigy-mounds, we must refer to some instances of their presence in other localities. This cut is an eagle effigy discovered in Georgia. Only one other instance, also occurring in Georgia, is known of effigy-mounds in the South. Measured from tip to tip of the wings, the bird,

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in this case, is one hundred and thirty-two feet. This structure is composed of stones, and a singular feature is the surrounding circle of stone.

Illustration of Big Serpent Mound.----------

Several examples of effigy-mounds are found in Ohio. The most notable one is that known as the Great Serpent Mound, in Adanis County. We give an illustration of it. The entire surrounding country is hilly. The effigy itself is situated on a tongue of land formed by the junction of a ravine with the main branch of Brush Creek, and rising to a height of about one hundred feet above the creek. Its form is irregular on its surface, being crescent-shaped, with the point resting to the north-west. We give in a note some of the dimensions. The figure we give of this important effigy is different from any heretofore presented. We are indebted for the plan from which the drawing was made to Rev. J. P. MacLean, of Hamilton, Ohio. Mr. MacLean is a well-known writer on these topics. During the Summer of 1884, while in the employ of the Bureau of Ethnology, he visited the place, taking with him a thoroughly competent surveyor, and

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made a very careful plan of the work for the Bureau. All the other figures published represent the oval as the end of the works. Prof. Putnam, who visited the locality in 1883, noticed, between the oval figure and the edge of the ledge, a slightly raised, circular ridge of earth, from either side of which a curved ridge extended towards the sides of the oval figure. Mr. MacLean's researches and measurements have shown that the ridges last spoken of are but part of what is either a distinct figure or a very important portion of the original figure. As figured, it certainly bears a very close resemblance to a frog, and such Mr. MacLean concludes it to be.

There is both a similarity and a difference between this work and those of Wisconsin. The fact that it occurs isolated, the other effigies in Ohio being many miles away, shows that some special purpose must have been subserved by it. There the great numbers gave us a hint as to their purpose. In this case, however, nearly all observers conclude that it was a religious work. Mr. MacLean, after describing these three figures, propounds this query: "Does the frog represent the creative, the egg the passive, and the serpent the destructive power of nature?" Not a few writers, though not acquainted with the presence of the frog-shaped figure, have been struck with the

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combination of the egg and the serpent, that plays such an important part in the mythology of the Old World. We are told that the serpent, separate or in combination with the circle, egg, or globe, has been a predominant symbol among many primitive nations. "It prevailed in Egypt, Greece, and Assyria, and entered widely into the superstitions of the Celts, the Hindoos, and the Chinese." "Wherever native religions have had their scope, this symbol is sure to appear."

Even the Indians have made use of this symbol. On Big Medicine Butte, in Dakota Territory, near Pierre, is a train of stones arranged in the form of a serpent, which is probably the work of the Sioux Indians. Around about on the hill is the burying-ground of their chiefs. This was to them sacred ground, and no whites were allowed near. The stones are about the size of a man's head, and are laid in two rows, from one to six feet apart. The length in all is three hundred and fifty feet, and at the tail, stones, to represent rattles, are rudely carved. The eyes are formed by two big red bowlders. No grass was allowed to grow between the two rows of stone.

It seems reasonable to suppose that the few isolated effigy mounds we have outside of Wisconsin were built to subserve a

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different purpose than those in that State. Mr. Peet has made some remarks on their probable use that seem to us to cover the ground, and to do away with any necessity of supposing on the part of its builders an acquaintance with Old World mythologies. Nature worship is one of the earliest forms of worship. The prominent features of a landscape would be regarded as objects of worship. Thus, for example, the island of Mackinac resembles in its outline the shape of a turtle; so the island was regarded as sacred to the turtle, and offerings were made to it. A bluff on the same island at a distance resembles a rabbit; accordingly, it was called by that name, and offerings were made to it. It is quite natural that the effigy-mound builders should seek to perpetuate by effigy some of these early traditions.

In the case of the Big Serpent mound this point is worth considering. The ridge on which it stands is not only in the midst of a wild, rough region, but is so situated that it commands a wide extent of country. In shape this tongue of land is also peculiar. It is a narrow, projecting headland, and would easily suggest the idea of a serpent or a lizard. "This, with the inaccessibility of the spot, would produce a peculiar feeling of awe, as if it were a great Manitou which resided there; and so a sentiment of wonder and worship would gather

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around the locality. This would naturally give rise to a tradition, or would lead the people to revive some familiar tradition and localize it." The final step would be to make an effigy.

It seems to us very hazardous to draw any conclusions as to the religious beliefs of the Mound Builders from this effigy, or combinations of effigies. It also seems to us reasonable to suppose that but one figure was intended to be represented. A very slight prolongation of the serpent's jaws and the limbs of the frog would connect them, in which case we would have some amphibious creature with an unduly extended tail, or perhaps a lizard. We must remember that the whole figure has been plowed over once or twice, so that we are not sure of the original outlines. We can not tell why they should represent a portion of the body as hollow, but neither can we tell why the head of the supposed serpent should be represented as hollow. We do not find any important earth-works near here. The hill on which it is placed commands a very extensive view of the surrounding country. Within the oval a pile of stones showed evidence of a long-continued fire, which would indicate that this was also a signal-mound. Prof. Putnam thinks it probable that there was a burial place between it and the large conical mound not

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far away.

In the vicinity of Newark, Ohio, are two examples of effigy mounds. This cut represents what is called the alligator mound, but it is probably the effigy of a lizard. The position which this mound occupies is significant. It is on the very brow of a hill about two hundred feet high, which projects out into a beautiful valley. The valley is not very wide. Directly across was a fortified camp, in the valley below it was a circular work, and a short distance below on another projecting headland was a strongly fortified hill. The great works at Newark were six miles down the valley, but were probably in plain view. That it was perhaps a signal station, is shown by the presence of traces of fire.

Illustration of Alligator Mound.----------

The length of this effigy is two hundred and five feet, the breadth of the body at its widest part, twenty feet, average height about four feet. The effigy mounds of Wisconsin, and the other few examples mentioned, are among the most interesting

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objects of aboriginal work. Except in a few favored instances, they are rapidly disappearing. To the leveling influence of time is added the assistance of man, and our knowledge of them will soon be confined to existing descriptions, unless something is at once done to preserve them from destruction.

Interesting mementos of a vanished race, we turn from their contemplation with a sigh of regret that, in spite of our efforts, they are still so enwrapped in doubt.

Mounds and effigies by no means complete the description of Mound Builders' remains. One of the most interesting and mysterious class of works is now to be described.

Early travelers in Ohio came here and there upon embankments, which were found to inclose tracts of land of various sizes.

It was noticed that the embankments were often of the form of perfect circles, or squares, or sometimes octagons, and very often combinations of these figures. It was further evident that the builders sought level, fertile lands, along the various river courses. They very seldom built them on undulating or broken ground. Often have the very places where civilized man has laid the foundation of his towns proved to be the sites of these ancient works of the Mound Builders, and thus it has happened that many of the most interesting works of antiquity

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have been ruthlessly removed to make way for the crowded streets and busy marts of our own times.

The larger number of inclosures are circular, often of a small size. Where they occur separately they either have no gateway, or but one. Sometimes the circles are of very large size, surrounding many acres. Sometimes, though not very often, a ditch was also dug inside the embankment. This last circumstance is by many regarded as a strong proof that the primary object of these circles was not for defense. But an inclosure of this kind, even with the ditch on the inside, if surmounted by a row of pickets or palisades, would prove a strong position against Indian foes armed with bow and arrow. The Mandans constructed defenses of this kind around their villages. As to the original height of the walls, in the majority of cases it was not very great, generally from three to seven feet.

It is estimated that in Ohio alone there are fifteen hundred inclosures, but a large number of them have nothing especially worthy of mention. Some, however, are on such a large scale that they call from all more than a passing glance. In contemplating them, we feel ourselves confronted by a mystery that we can not explain. The ruins of the old world excite in us the liveliest

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feeling of interest, but we know their object, their builders, and their probable antiquity. The mazy ruins at Newark, and other places in Ohio, also fill the mind with astonishment, but in this case we are not certain of their antiquity, their builders are unknown, and we can not conjecture with any degree of certainty as to their use. Before so many uncertainties imagination runs riot, and we are inclined to picture to ourselves a scene of barbaric power and magnificence.

Illustration of High Bank Works.----------

One beautiful specimen of this work is found in this cut. It occurs on the right bank of the Scioto river, five miles below Chillicothe. Here we notice a combination of the octagon and the circle. The areas of each are marked. The octagon is nine hundred and fifty feet in diameter. and nearly regular in shape. In 1846 its walls were eleven or twelve feet high, by about fifty feet base. It will be noticed that there is a gate at or near each angle of the octagon except one, and in front of that angle was a pit, from which some of the earth to form the walls was taken. Facing each gateway a mound was placed, as if

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to guard the entrance.

The circle connected with the octagon is perfect in shape, and is ten hundred and fifty feet in diameter. Its walls were only about half the height of the octagon. We notice some other small circular works in connection with the main work. In this case the parallels are not very regular, and seem to be connected with one or more circular works. In a work situated but a few miles from the one here portrayed, the parallels extend in one direction nearly half a mile, only one hundred and fifty feet apart. They terminate on the edge of a terrace. The object of such parallels is as yet unknown. In some cases, after extending some distance, they simply inclosed a mound.

It is easy enough to describe this work and give its dimensions, but who will tell us the object its builders had in mind? The walls themselves would afford but slight protection and if they were for defense, must have been surmounted with palisades. Works that were undoubtedly in the nature of fortified camps, are found in this same section, and one of the strongest was located not more than twelve miles away; but such defensive works differ very greatly in design from regular structures such as we are now describing. A very eminent scholar, Mr. Morgan,

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has advanced the theory that the walls were the foundations on which communal houses, like the Pueblos of the West, were erected. But this is mere theory. All traces of such habitations (if they ever existed) are gone, the usual *debris* which would be sure to accumulate around house-sites, is wanting, and the walls themselves seem unfit for such purpose.

They may have been embankments surrounding towns and cultivated fields, but little has yet been found which can be cited as proofs of residence within the area so inclosed. We should not be surprised, however, if such would ultimately prove to be the case, since we now know that the Mound Builders of Tennessee did fortify their villages by means of embankments and ditches.
A number of writers think that these regular inclosures were in some way connected with the superstitions of the people.
In other words, that they were religious in character.
Mr. Squier remarks, "We have reason to believe that the religious system of the Mound Builders, like that of the Aztecs, exercised among them a great, if not a controlling, influence.
Their government may have been, for aught we know, a government of the priesthood--one in which the priestly and civil functions were jointly exercised, and one sufficiently powerful to have

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secured in the Mississippi Valley, as it did in Mexico, the erection of many of those vast monuments, which for ages will continue to challenge the wonder of men. There may have been certain superstitious ceremonies, having no connection with the purpose of the mound, carried on in inclosures especially dedicated to them." Another late writer to whom we have several times referred, tells us there is no doubt but what a "religious view" was the controlling influence in the erection of these works, and that they express a "complicated system of symbolism," that we see in them evidence, of a most powerful and wonderful religious system. Still such assertions are easier made than proven, and until we know somewhat the purpose for which they were used, how are we to know whether they were sacred or not?

Casting conjectures, for the moment, aside, let us learn what we can from the works themselves. From their large extent they could only be reared by the expenditure of great labor. This implies some form of government sufficiently centralized and powerful to control the labors of large bodies of men. Moreover, they were sufficiently advanced to have some standard of measurement and some way of measuring angles. The circle, it will be remembered, is a true circle, and of a dimension

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requiring considerable skill to lay out. The sides of the octagon are equal, and the alternate angles coincident.

Every year the plow sinks deeper into these crumbling embankments, and the leveling forces of cultivation are continually at work, and the time is not far distant when the curious traveler will with difficulty trace the ruins of what was once, to the Mound Builders, a place of great importance.

Illustration of Square and Circle Embankment.----------

The more usual combination was that of a square and a circle. An example is given in this cut, which is a plan on a very small scale, of works which formerly existed in Circleville.
One peculiar feature about this work was that a double wall formed the circle, with a ditch between the two walls. In the next cut we notice a peculiar combination of these two figures. The square is inclosed within the circle. Whatever we may ultimately decide as to the larger works, it would seem as if this could only be explained as in the nature of a religious work. We can see no reason for constructing a defensive work, or

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inclosing a village, or erecting foundations for houses of such a shape as this. They must have been in some way connected with the superstitions of the people.

Illustration of Square inscribed in a Circle.--------

A peculiar feature is also noticed in reference to some of the smaller circles in this section. The cut below illustrates it. The circle has a ditch interior to the embankment, and also a broad embankment of about the same height with the outer wall, interior to the ditch, running about half-way around the circle. A short distance from the circle was one of those elevated squares, one hundred and twenty feet square at the base, and nine feet high. It may be that this square was the foundation on which stood a temple, in which case the circle might have been dedicated to religious purposes also.

Illustration of Circle and Ditch.----------

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The great geometrical inclosures are especially numerous in the Scioto Valley. All the works we have described were in the near neighborhood of Chillicothe, and works as important as these are scattered all up and down the valley. We must also recall how well provided this valley was with signal mounds. All indications point to the fact that here was the location of a numerous people, ready to defend their homes whenever the warning fires were lit. Although Mound Builders' works are numerous in the valley of the two Miami Rivers, Cincinnati being the site of an extensive settlement, yet they were not such massive structures as those in the Scioto. This would seem to indicate that these valleys were the seats of separate tribes. But this Eastern tribe must have occupied an extensive territory, since works of the most complicated kind are found at Newark.

All indications point to the fact that near this latter place was a very important settlement of the Mound Builders. Several fortified works exist a few miles up the valley; signal-mounds are to be seen on all heights, commanding a wide view, and the famous alligator mound is placed, as if with the design of guarding the entrance to the valley. No verbal description will give an idea of the works, so we refer at once

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to the plan. This will give us a good idea of the works as they were when the first white settlers gazed upon them. They have nearly all been swept away by modern improvements, excepting the two circular works and the octagon. Here and there fragments of the other works can still be traced.

Illustration of Mound Builders' Works, Newark, Ohio.-------

Two forks of the Licking River unite near Newark; the bottom between these rivers comprising several square miles, was occupied by these ancient earth-works. By reference to the plan, we see the works consisted of mounds of various sizes, parallel walls, generally of a low elevation, small and low embankments, in the form of small circles and half-circles. There are also several large works consisting of a circle and octagon combined, one large circle, and a parallelogram. "The circular structure at 'E,' is undoubtedly one of the best preserved and most imposing in the State. There are many inclosing larger areas, but none more clearly defined. As this is now included in the fair-grounds of Licking County, it is preserved from destruction, and will remain a monument of aboriginal work long

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after all traces of the others have disappeared. "At the entrance, which is towards the east, the ends of the walls curve outwards for a distance of a hundred feet, leaving a passage way eighty feet wide between the deep ditches on either hand." From this point the work, even now presents an impressive appearance. The walls are twelve feet in perpendicular height, and about fifty feet base. There is a ditch close around it on the inside, seven feet deep by thirty-five feet wide. The area inclosed is about thirty acres.

Illustration of Eagle Mound.----------

In the center is an effigy-mound, represented by this cut. It represents a bird on the wing, and is called the Eagle Mound. The long mound in the body of the bird has been opened, and it was found to contain an altar, such as has been already described. Was this a place of sacrifice, and did this wall inclose a sacred area? Our question remains unanswered. We can dig in the mounds, and wander over the embankments, but the secret of the builders eludes us.

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A mile to the north-west of the part of the work just described are the Octagon and works in connection with it. The Octagon is not quite regular, but the sides are very nearly equal. At each angle is a gateway, interior and opposite to which is a mound, as if to guard the opening. The cut gives a view of the Octagon, looking in through one of these gateways. At present, however, but a small portion is in the forest. Most of it is under cultivation, but the work can still be easily traced, and is one of the best preserved in the State. A portion of it, still in the forest, presents the same appearance to-day as it did to the first explorer. When a stranger for the first time wanders along the embankment and ascends the mounds, he can not fail to experience sensations akin to those of the traveler when he comes upon the ruins of some Old World city. We wish that for a brief space of time the curtain of the past would up-roll, and let us view these works while yet their builders flourished here.

Illustration of Gateway of Octagon.----------

Connected with the Octagon by parallel walls three hundred feet

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long and placed sixty feet apart, is the smaller circle, "F." This is a true circle, and is upwards of half a mile in circumference. A portion of it lying in the woods, still retains its primitive form, but the larger part is now under cultivation. There is no difficulty, however, in tracing its entire length. The most interesting feature in connection with this part of the work is immediately opposite the point of entrance from the octagon, and is represented in our next cut. At this point it seems as if the builders had started to make parallel walls, but afterwards changed their design and threw across the opening a large mound. From this mound a view of the entire embankment could be obtained. It is called the Observatory Mound. It has been so often dug into that it is now really in ruins, but is still too steep to be plowed over.

Illustration of Observatory Mound, Newark Works.--------

It is scarcely necessary to describe the works further, except to state that three lines of parallel embankments lead away from the octagon. Those extending south have been traced for upwards of two miles, and are gradually lost in the plain. It was the

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opinion of Mr. Atwater, one of the earliest investigators, that these lines connected with other works thirty miles away, in the vicinity of Lancaster. Small circles are numerous in connection with these works. It has been suggested by several that they mark the sites of circular dwellings. The larger ones, indicated by the letter "G," are more pretentious. They have the ditch and embankment, which we have already described. Many interesting coincidents in dimensions will be perceived between portions of this work and those described in the Scioto valley.

Although we have devoted considerable space to this branch of the Mound Builders' work, we must still find space to describe the works at Marietta, which possessed some singular features. This cut gives us a correct plan of the works as they were when in 1788 the first settlers arrived at the mouth of the Muskingum to lay out their town. The growth of the beautiful town of Marietta has completely destroyed these works, except the elevated squares, A and B, the large mound and inclosing circle at X, with a portion of the adjoining embankments, and a small fragment of the parallel walls forming what has been called the "Graded Way." The elevated squares are the finest examples of "temple" mounds remaining in the Ohio Valley. The circle and

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ditch with the conical mound inclosed is also a fine example of that class of works. From the summit of the mound an extensive view is to be had both up and down the Ohio.

Illustration of Works at Marietta, Ohio.----------

The gateways of the smaller square were guarded by mounds, which were wanting in the larger one. We would call especial attention to the two embankments which led from the larger square towards the river. They were six hundred and eighty feet long, and one hundred and fifty feet apart. Some have supposed these walls were designed to furnish a covered way to the river. But as Mr. Squier remarks, we would hardly expect the people to go to the trouble of making such a wide avenue for this purpose, nor one with such a regular grade. Besides, the walls did not reach the river. The work seems to be simply a passage way, leading from one terrace to the other, but why the builders should have made such a massive work, we can not explain. It has been called the "Sacred Way," and this name may possibly be applicable, but it is only conjectural. Some twenty years ago these two massive and beautiful embankments were still preserved, thanks to the

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care of the early settlers, who planned a street to pass between them, which was named the *Via Sacra*. These words still remain on a corner signboard; but alas for sentiment! the banks, so long revered, have been utilized for brick-working.

Illustration of Graded Way, Piketon, Ohio.----------

Several instances of these graded streets or ways have been found in connection with the Mound Builders' works. Sometimes they lead from one terrace to another, sometimes directly to the water. One of the latter kind formerly existed near Piqua, Ohio. This cut is a view of a graded way near Piketon, Ohio. In this case, though the difference in level between the second and third terrace is but seventeen feet, these ancient people laid out a graded ascent some ten hundred and eighty feet long, by two hundred and ten feet average width. The earth was thrown out on either side, forming embankments. From the left hand embankments, passing up to the third terrace, there could formerly be traced a low embankment running for fifteen hundred feet, and connected with mounds and other walls at its extremity.

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Some have supposed that formerly the river flowed at the extremity of this graded way, and a passage way to the water was thus furnished. Squier says, in this connection: "It is sufficient to observe that the river now flows half a mile to the left, and that two terraces, each twenty feet in height, intervene between the present and the supposed ancient level of the stream. To assent to this suggestion, would be to admit an almost immeasurable antiquity to the structure under consideration." The casual observer would say that it was intended to afford an ascent from one terrace to the other. But as the height was only seventeen feet, we can not see why it was so necessary to have a long passage way of easy grade from one terrace to the other. It was evidently built in connection with the obliterated works on the third terrace.

This interesting remain is now utilized as a turnpike, and the passing traveler but little recks he is going over one of the most ancient causeways in the land. It may be that ceremonious processions, with stately tread, utilized this causeway in years long since elapsed. Speculation, always an unsafe guide to follow, is especially so in this case, and so we leave this memento of a vanished people as much an enigma to us as to its first explorers.

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We have described but a few of the sacred inclosures of Ohio, but enough have been given to give us a fair idea of all.

We wish now to call attention to another class of remains.

We have seen how the works we have been describing are lacking in defensive qualities. This becomes more marked, when we learn there are works, beyond a doubt, defensive in character, in which advantage is taken of all circumstances which would render the chosen retreat more secure. In the first place, strong natural positions were selected. They chose for their purpose bluffy headlands leading out into the river plain. A people surrounded by enemies, or pressed by invaders, would naturally turn their attention to such heights as places susceptible of defense. Accordingly, it does not surprise us to find many heights occupied by strong and complicated works. Generally the approaches to them were rugged and steep on all but one or two sides, and there they are guarded by walls of earth or stone.

A fine example of a fortified hill was discovered in Butler County, Ohio, a few miles below the town of Hamilton. This hill is the highest one in the immediate vicinity. By reference to the figure, we see that on all sides, except towards the north, the approach was steep and precipitous, almost inaccessible.

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Illustration of Fortified Hill, Hamilton, Ohio.--------

The wall is not of regular shape. It runs around on the very brow of the hill, except in one or two places, where it cuts across a ridge. In 1843 this wall was still about five feet high and thirty-five feet base. The earth and stone of which the wall is made were evidently gathered up from the surface of the hill. In some places holes had been excavated, probably for the double purpose of securing materials for the wall, and providing reservoirs for water against a time of need. There are but four openings in the wall, and each is very carefully guarded. The complicated walls guarding the main entrance to the north are especially noticeable. There are no less than four inner walls besides the crescent shaped embankment on the outside. The signal mound was about five hundred feet to the north of the main opening. The stones on the surface of the mound all show the action of fire.

If we were uncertain of the uses of the other class of inclosures, which have been named Sacred Inclosures, we have no

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need to hesitate as to the character of this work. Every thing in reference to it betokens that it was a defensive work. The valley of the Big Miami, in which it occurs, was a favorite resort of the Mound Builders. On the opposite side of the river, to the south, was a square and an ellipse combined, and several other large works were ranged along the river in the course of a few miles. We need scarcely doubt that this was a citadel in times of need, and that when warning columns of smoke or flaming fires showed the approach of an enemy, the old and the sick, the women and the children, fled hither for protection, while the warriors went forth to battle for their homes.

We will call attention to but one more of these fortified hills, but this is on a magnificent scale. It is known as Fort Ancient, and is situated on the Little Miami River, about forty miles east of Cincinnati. It was not only a fort, but was also a fortified village site, and has some features about it which are regarded as of a religious nature. The hill on which it stands is in most places very steep towards the river. A ravine starts from near the upper end on the eastern side, gradually deepening towards the south, and finally turns abruptly towards the west to the river. By this means nearly the whole work occupies the summit of a detached hill, having in most places very steep

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sides. To this naturally strong position fortifications were added, consisting of an embankment of earth of unusual height, which follows close around the very brow of the hill. This embankment is still in a fine state of preservation, but is now annually exposed to cultivation and the inroads of cattle, so that it will not be long before it will be greatly changed if no effort be made to preserve it.

Illustration of Fort Ancient, Little Miami River.-------

This wall is, of course, the highest in just those places where the sides of the hill are less steep than usual. In some places it still has a height of twenty feet. We notice the wall has numerous breaks in it. Some of these are where it crosses the ravines, leading down the sides of the hill. In a few cases the embankment may still be traced to within a few feet of a rivulet. Considerable discussion has ensued as to the origin and use of these numerous gateways. Mr. Squier thinks that these openings were occupied by timber work in the nature of blockhouses which have long since decayed. Others, however, think that the wall was originally entire except in a few

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instances, and that the breaks now apparent were formed by natural causes, such as water gathering in pools, and musk-rats burrowing through the walls, and we are told that such an opening was seen forming in the year 1847. No regular ditch exists inside the wall, the material apparently being obtained from numerous dug holes.

It will be seen that the works could be naturally divided into two parts, connected by the isthmus. More than one observer has pointed out the resemblance in general outline of this work to a map of North and South America, but of course the resemblance, if any, is entirely accidental. Mr. Peet has called attention to the resemblance which the walls of the lower inclosure bear to two serpents, their heads being the mounds, which are separated from the body by the opening which resembles a ring around the neck. Their bodies are the walls, which, as they bend in and out, and rise and fall, much resembles, he thinks, two massive green serpents rolling along the summit of this high hill.
If any such resemblance occurs, we think it purely accidental.
In relation to the wall across the isthmus, it has been thought to have been the means of defending one part of the work should an enemy gain entrance to the other. It has also been supposed that at first the fort was only built to the cross wall on the

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isthmus, and afterwards the rest of the inclosure was added to the work.

The total length of the embankment is about five miles, the area enclosed about one hundred acres. For most of this distance the grading of the walls resembles the heavy grading of a railroad track. Only one who has personally examined the walls can realize the amount of labor they represent for a people destitute of metallic tools, beasts of burden, and other facilities to construct it.

Now, what was the object of this work? We think it was not simply a fort, but rather a fortified village. That it must have required the work of a numerous body of people, is undoubted, and if they lived elsewhere, where are the works denoting such a fact? We would further suggest that, if this was the seat of a tribe, each of the two divisions might have been the location of a phratry of the tribe, by a phratry, meaning the subdivision of a tribe. We would call especial attention to the two mounds seen just outside of the walls at the upper end. From these mounds two low parallel walls extended in a north-easterly direction some thirteen hundred and fifty feet, their distant ends joining around a small mound. As this mound was not well situated for

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signal purposes, inasmuch as it did not command a very extensive view, and as the embankments would afford very little protection, unless provided with palisades, it seems as if the most satisfactory explanation we have is that it was in the nature of a religious work.

Mr. Hosea thinks he has found satisfactory evidence that between these walls there was a paved street, as he discovered in one place, about two feet below the present surface, a pavement of flat stones. From this, as a hint, he eloquently says: "Imagination was not slow to conjure up the scene which was once doubtless familiar to the dwellers at Fort Ancient. A train of worshipers, led by priests clad in their sacred robes, and bearing aloft the holy utensils, pass in the early morning, ere yet the mists have risen in the valley below, along the gently swelling ridge on which the ancient roadway lies. They near the mound, and a solemn stillness succeeds their chanting songs; the priests ascend the hill of sacrifice and prepare the sacred fire. Now the first beams of the rising sun shoot up athwart the ruddy sky, gilding the topmost boughs of the trees. The holy flame is kindled, a curling wreath of smoke arises to greet the coming god; the tremulous bush which was upon all nature breaks into vocal joy, and songs of gladness bursts from the throats of

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the waiting multitude as the glorious luminary arises in majesty and beams upon his adoring people. A promise of renewed life and happiness. Vain promise, since even his rays can not penetrate the utter darkness which for ages has settled over this people." Thus imagination suggests, and enthusiasm paints a scene, but, from positive knowledge, we can neither affirm nor deny its truth.

Most of the works of the Mound Builders are noticeable for their solidity and massiveness. We see this illustrated in the great walls of Fort Ancient. Some of our scholars think this is a distinguishing feature of the Mound Builders' work. It seems to us that it is difficult to make this a distinguishing feature, as we have no means of knowing how much "massiveness" is required in a work to entitle it to be considered a work of the Mound Builders. Should this distinction be established, however, we have to notice that while in the western part of the State of Ohio the Mound Builders' inclosures are more often of the defensive sort, the type changes to the eastward, where, as in the Scioto Valley, we find the so-called sacred inclosures in larger numbers. In the State of Ohio, then, there were at least two well defined types of works by the Mound Builders. But if we split the Mound Builders up into tribes, where shall we draw the

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line between them and our later Indians?

Illustration of Fortified Headland, Northern Ohio.------

Illustration of Inclosures, Northern Ohio.--------

Scattered through Ohio, but especially abundant in the northern part of the State, is a class of works which has excited considerable comment. This cut illustrates a work of this kind. It was located near where Cleveland now stands. The defense consists mainly in the location. The wall seems to have been rather of a secondary affair. The hill was too steep to admit approach to it except from the rear, where the double wall was placed. With both of these works a ditch was dug outside the wall. These works did not always consist simply of fortified headlands. This cut is of a portion of the works formerly existing near Norwalk, Ohio. The circular work, D, is shaped much like the sacred inclosures, though not on so large a scale. In the larger work, at B, we notice a truncated mound. The ditch is on the outside of the circles. This cut is of a work formerly on the banks of the Black River. Here we have a square

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inclosure, defended by two embankments and a ditch.

Illustration of Square Inclosure, Northern Ohio.-------

This class of works was formerly common not only in Ohio and Western New York, but they were also to be observed in other sections of the country. They existed alike in the valley of the two Miami Rivers, and in that of the Scioto. They were also found throughout the South. Even Wisconsin, the home of the effigy Mound Builders, is not destitute of this class of remains. The peculiar interest attaching to them arises from the fact that in some places, at least, we have good reason to assign their construction to Indian tribes. Those of Western New York were very thoroughly studied by Mr. Squier. When he commenced his investigations, he was under the impression that he was dealing with the remains of a people very similar, at least, to those who built the massive works in the Ohio Valley and elsewhere, but he was led to the conviction that they were the works of the Iroquois Indians, and as further proof that such was the case, we are told that since the palisades that once inclosed places known to be villages of the Iroquois have disappeared, there is no difference to be observed between the

appearance of the ruins of such a village site and any of the

earthworks in Western New York. But we have just stated that the

remains last mentioned are identical with those found in

Northern Ohio, and indeed over a wide extent of country.

The conclusion seems to be, then, that one large class of works

in many points resembling Mound Builders' works, found widely

distributed throughout the Mississippi Valley, were really the

works of Indians. But we are approaching a subject we do not

wish to discuss just yet. We simply point out that not all the

remains of prehistoric people in the Mississippi Valley are

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referable to the Mound Builders.

We have tried to point out the more important works that are ascribed to them. It must of necessity occur in a work of this nature that the review should be very brief, yet we have touched on the different classes of their works. But before leaving this part of our field we must mention some anomalous works, and refer to others which, if they can be relied on as works of the same people, certainly imply a great advance on their part.

Our next cut is named by Mr. Pidgeon the "Sacrificial Pentagon." Writing in 1850, he states, "This remarkable group . . . has probably elicited more numerous conjectures as to its original use than any other earth-work yet discovered in the valley of the Mississippi. . . . It is situated on the west highlands of the Kickapoo River, in Wisconsin." Mr. Pidgeon claims to have discovered two of these pentagons. We are not aware that any one else has verified these discoveries, and it is difficult to decide what value to give to his writings. He claims to have made extensive researches around the head-waters of the Mississippi as early as 1840, and there to have met an aged Indian--the last of his tribe--who gave him many traditions as to the mounds in that locality. Most of our scholars think his

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writings of no account, whatever, and yet Mr. Conant says, "He seems to have been a thoroughly conscientious and careful observer, faithfully noting what he saw and beard."

Illustration of Sacrificial Pentagon.----------

We will briefly describe a few of the earth-works he mentions, notice their singular form, and give an outline of the traditions in regard to them, leaving the reader to draw his own conclusions. Of this work the outer circle is said to have been twelve hundred feet in circumference, the walls being from three to five feet in height; width on the ground from twelve to sixteen feet. The walls of the pentagon were from four to six feet high. The inner circle was of very slight elevation. The central mound was thirty-six feet in diameter. This singular arrangement of circle, pentagon, and mounds, is traditionally represented to have been a sacred national altar--the most holy one known to tradition--and no foot, save that of a priest, might pass within the sacred walls of the pentagon after its completion. The sacrifice offered on this altar was that of human life. Twice each year the offering was made.

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The work represented in the figure below is stated to have been in the near neighborhood of the former, and to have been intimately connected with it. Mr. Pidgeon claims to have found five of these circles and two pentagons. So far as we know, he is the only authority for their occurrence, no one else having been so fortunate as to have found them. This is surely a singular work, and we can not fail to recognize in it a representation of the sun and the moon. In excavating in the central mound, we are assured that small pieces Of mica were found abundantly mixed with the soil. "Had the surface-soil been removed with care, and the stratum beneath been washed by a few heavy showers of rain, so thoroughly studded was it with small particles of mica, that under the sun's rays it certainly would have presented no unapt symbolic representation of that luminary."

Illustration of Festival Circle.----------

Our next figure is another singular arrangement of crescent-shaped works and mounds. Lapham says that

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crescent-shaped works are found in Wisconsin. Pidgeon says that crescent works are found in Illinois, but works arranged as shown in this wood-cut he found in but four places in Wisconsin. Could we verify this author's statements, this illustration and the preceding one would be very good evidence of the prevalence of sun-worship among the effigy Mound Builders of Wisconsin. This would be nothing singular, since the Indian race almost universally reverenced the sun.

Illustration of Crescent Works.----------

The figure below represents a group of works which, we are told, were of a class formerly abundant in Missouri and Iowa. The embankments are stated to be of varying heights, but all of the same length. They do not quite meet, but a mound defends the opening. Sometimes a square is so represented, and sometimes but two walls.

Illustration of Triangular Works.----------

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A singular statement is made in reference to a nice proportion said to be observed between the heights of the embankments and walls. In this case, for instance, the heights of the embankments are, three, four, and five feet; the sum of these, twelve feet, was the exact height of the central mound. Furthermore, the square of the sum of the heights of three embankments gives us one hundred and forty-four feet, which is the length of the embankments. We are gravely assured that this same nice proportion is always observed in works of this kind. The embankments being always of equal length, but of varying heights, still the sum of these heights, whether three or four sides, being always equal to the height of the central mound. We do not know of any specimen of this class of works now existing. If this early explorer's account be reliable, then we have in works of this class very good evidence that some of their inclosures were in the nature of sacred inclosures.

The trouble is to verify Mr. Pidgeon's account. There is a good deal that is strange and marvelous in reference to the Mound Builders, and we must use judgment as to what is told us, unless we are sure there is no mistake, or unless the reports are vouched for by many observers.

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We wish to call attention to some singular works in Missouri, which would imply that the Mound Builders were possessed of no little engineering skill. We have every indication that near New Madrid was a very extensive settlement. The works consist of inclosures, large and small mounds in great numbers, and countless residence sites. One of fifty acres was noticed, which had evidently been inclosed by earthen walls. In some places in the forest, where this wall had been preserved, its height was found to be from three to five feet, and its base width fifteen feet. But the suggestive features about these works are noticed along the edge of the swamp near which they stood. This swamp in 1811 was a lake, with a clear, sandy bottom. It is not at all doubted but that it was at one time the bed of the Mississippi River, and probably this town stood on its banks. The river is now some eighteen miles away. It must suddenly have changed its course, leaving behind it a lake, which, in course of time, became a swamp.

But along the shores of this ancient lake, "in front of the inclosure, small tongues of land have been carried out into the water, from fifteen to thirty feet in length, by ten, or fifteen in width, with open spaces between, which, small as they are, forcibly remind one of the wharfs of a seaport town. The cypress

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trees grew very thickly in all the little bays thus formed, and the irregular, yet methodical, outlines of the forest, winding in and out close to the shore of these tongues of land, is so marked as to remove all doubt as to their artificial origin. The suggestion is made in view of these wharfs, that the Mound Builders must have had some sort of boats to navigate the waters of the lake.

And the singular part is, that right in this neighborhood are many evidences of a system of canals. A glance at the map will show that the portion of Missouri around New Madrid, and to the south of it, is dotted with swampy lakes and sluggish bayous. The evidence is to the effect that the ancient inhabitants connected these bayous and lakes with artificial canals, so as to form quite an extended system of inland water-ways. Right east of the town of Gayoso, we are told that a canal had been dug that now connects the Mississippi with a lake called Big Lake. A bayou running into this lake was joined by a canal with Cushion Lake.

From this last lake, by means of bayous and lakes, a clear course could be pursued for some miles north, where finally another canal was cut to join with the Mississippi a few miles

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below New Madrid. The entire length of this water way was some seventy miles, but we are not told how much of it was artificial, neither are the dimensions given. Prof. Swallow speaks of a canal "fifty feet wide, and twelve feet, deep." Whether this was one of this series or not, we do not know. This is indeed a singular piece of work. It would be more satisfactory if we had more definite information in regard to the same.

With our present knowledge of the state of society among the Mound Builders, as made evident by the remains of their implements and ornaments, we are not justified in believing this part of a system of internal navigation. We have already seen that further south they sometimes surrounded their village sites with a wide and deep moat or ditch, as was observed around the inclosure containing the great mound on the Etowah. We are inclined to believe that a more careful survey would greatly modify the accounts we have of these canals, if it did not, in fact, show that they were the works of nature. According to a writer in the *American Antiquarian,* the whole lower part of the Mississippi Valley was abundantly supplied with canals, irrigating ditches, and evidences of a high intelligence. He speaks of observing the presence of an

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extensive canal a little north of the section we have described. He asserts they were dug to convey the surplus waters of the Mississippi in times of flood to the White and St. Francis Rivers, thus preventing disastrous overflows. It is needless to caution the reader against such conclusions. Our information in regard to those canals is far too limited to support the views advanced.

This finishes our examination of the works of the Mound Builders. Except in the case of the more massive works, they have become obliterated, but here and there are left traces of the former presence of these now vanished people. The antiquary muses over the remains of their inclosures, their fortified places, their effigies and mounds. By the combined efforts of scholars in many departments, we may yet hope that the darkness now enshrouding this race may be dissipated, but at present our positive knowledge is very limited indeed. It is as if we were asked to reconstruct a picture which had faded in the lapse of time so that only traces here and there are visible.
Here, perhaps, a hand is seen; there a piece of foliage; in one place something we think representing water, in another a patch of sky, or a mountain peak. Until a key is found which shall show us how to connect these scattered parts, our efforts are

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useless, since many pictures could be formed, but we have no surety we are right. So we may form mental conceptions of the Mound Builders, but they are almost as varied as the individual explorers. Science may yet discover the key which will enable us to form a clear mental conception of the race which flourished here many years ago, and left their crumbling memorials to excite the curiosity of a later people.

We must now turn our attention to another branch of inquiry and learn what we can of the culture of the Mound Builders. This is to be determined by an investigation of the remains of their implements, weapons, and ornaments. When we know the skill with which they manufactured these articles, and gain an insight into some of their probable customs, we shall know where to place them in the scale of civilization. What we have learned of their works has already convinced us that we are dealing with a people considerably above the scale of Savagery. The nice proportion between the parts, the exact circles and coincident angles show considerable advance in mechanical skill. The character of the works indicates that the people had permanent places of abode, and were not subject to the vicissitudes of a hunter's state of life for subsistence. This implies that we are dealing with a people living in village communities, practising agriculture and

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many other arts, and therefore entitled to rank in the middle status of Barbarism corresponding to the Neolithic inhabitants of Europe. We will now see how far this conclusion is sustained by an examination of the remains of the handiwork of the people.

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